

Environmental Assessment of Remove Objects Along Flightline At Davis-Monthan Air Force Base, Arizona

Davis-Monthan AFB

August 2005



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ABBREVIATIONS AND ACRONYMS

°F	Degrees Fahrenheit
355 WG	355th Wing
355 CES/CEV	355th Environmental Quality Flight
A/DS	Approach-Departure Clearance Surface
ACC	Air Combat Command
ACM	Asbestos-Containing Material
ADA	Arizona Department of Agriculture
AFI	Air Force Instruction
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health
AFPD	Air Force Policy Directive
AGF	Arizona Game and Fish Department
AMARC	Aerospace Maintenance and Regeneration Center
ANG	Air National Guard
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
BRL	Building Restriction Line
C&D	Construction and demolition
CAA	Clean Air Act
CAIS	Chemical Agent Identification Sets
CAP	Centralized Accumulation Point
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CINC	Commander-in-Chief
CO	Carbon Monoxide
CWA	Clean Water Act
CY	Calendar Year
CZ	Clear Zone
DMAFB	Davis-Monthan Air Force Base
DOD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive ordnance disposal
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FEMA	Federal Emergency Management Agency
FIG	Fighter Intercept Group
FIP	Federal Implementation Plan
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FONPA	Finding of No Practicable Alternative
GA	Graded Area
HAZWOPER	Hazardous Waste Operations and Emergency Response
HQ	Headquarters
HSWA	Hazardous and Solid Waste Amendments
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
ILS	Instrument Landing System

INF	Intermediate-Range Nuclear Forces
INRMP	Integrated Natural Resource Management Plan
MAJCOM	Major Commands
mg/m ³	milligrams per cubic meter
MSA	Munitions Storage Area
msl	Mean sea level
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxide(s)
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NRHP	National Register of Historic Places
NSR	New Source Review
O ₃	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PDEQ	Pima County Department of Environmental Quality
PM ₁₀	Particulate Matter ≤ 10 microns in diameter
PM _{2.5}	Particulate Matter ≤ 2.5 microns in diameter
POL	Petroleum, Oil, and Lubricants
ppm	Parts per million
PS	Primary Surface
PSD	Prevention of Significant Deterioration
QD	Quantity-Distance
RCRA	Resource Conservation and Recovery Act
SAP	Satellite Accumulation Point
SARA	Superfund Amendments and Reauthorization Act
SATAF	Site Activation Task Force
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO ₂	Sulfur Dioxide
START	Strategic Arms Reduction Treaty
tpy	tons per year
TS	Transitional Surface
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulate
U.S.	United States
U.S.C.	United States Code
UFC	Unified Facilities Criteria
USAF	United States Air Force
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded ordnance
VOC	Volatile Organic Compound
xH:xV	X-foot horizontal to x-foot vertical
µg/m ³	micrograms per cubic meter

**FINDING OF NO SIGNIFICANT IMPACT (FONSI)
AND
FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)**

1.0 NAME OF THE PROPOSED ACTION

Remove Objects Along Flight Line at Davis-Monthan Air Force Base (DMAFB), Arizona.

The purpose is to protect lives and USAF property, maximize the safety and efficiency of runway operations, meet constant availability standards of an unrestricted approach during landing procedures, and maintain precision landing capability for all aircraft operations at Davis-Monthan Air Force Base (DMAFB).

2.0 DESCRIPTION OF PROPOSED ACTION, ALTERNATIVES, AND NO ACTION ALTERNATIVE

To ensure the safety of flight operations, runways at USAF installations such as DMAFB, must comply with Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design* and with the Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*. These documents establish standards for determining obstructions to air navigation and apply to existing and proposed manmade objects, objects of natural growth, and terrain. Both these documents require that all manmade and natural objects must be removed from an expanded zone (1,000 feet from runway centerline and within the safety clearance zones [CZ] at each end of the runway) around the flight line.

The direct elimination of threats to air navigation at DMAFB is a U.S. Air Force (USAF) and Federal Aviation Administration (FAA) requirement. Removal of airfield obstacles is necessary to maintain DMAFB's critical airlift mission and to bring the base into compliance with applicable USAF and FAA airfield criteria as set forth in UFC 3-260-01 and FAR Part 77.

Four alternatives were evaluated as part of the Environmental Assessment (EA): proposed action, Alternative A, Alternative B, and No Action Alternative.

Proposed Action. The proposed action consists of four parts: obtain permanent airfield waivers for objects that will remain within the Building Restriction Line (BRL) and CZs and that meet the minimum requirements specified in UFC 3-260-01 and FAR Part 77; obtain temporary airfield waivers for objects that cannot be immediately brought into compliance with UFC 3-260-01 and FAR Part 77 regulations because of budget and mission constraints; demolish or relocate objects within the BRL and CZs; and remove 297 acres of vegetation by grading all vegetated areas located within the BRL and CZs according to the requirements specified in UFC 3-260-01 and FAR Part 77. The proposed action would disturb approximately 335 acres of soil. After these areas have been cleared, the areas would be revegetated with an approved native grass seed mix.

Alternative A. Alternative A also consists of four parts. The first three parts are identical to the proposed action. Part four consists of removing 177 acres of vegetation by grading only those portions of the BRL and CZs with a basal diameter greater than two inches where it presents a safety hazard to aircraft and personnel and where the vegetation penetrates the imaginary surface. All other vegetation that is within the BRLs and CZs that do not present a safety concern or do not penetrate the imaginary surface would obtain a permanent airfield waiver. Alternative A would disturb approximately 216 acres of soil. After these select areas have been cleared, they would be revegetated with an approved native grass seed mix.

Alternative B. Alternative B would be the same as Alternative A except that perimeter/Columbia Drive and the hill terrain feature in the PS 12 end (Object Nos. 1 and 7) would not be demolished and brought down to grade. Alternative B would disturb approximately 185 acres of soil.

No Action Alternative. Under the No Action Alternative, permanent and temporary airfield waivers would not be obtained for the violating structures, and these structures would remain out of compliance with UFC 3-260-01 and FAR Part 77. No measures would be taken to bring DMAFB into conformance with UFC 3-260-01 or FAR Part 77. Vegetation would continue to be trimmed as necessary to prevent penetration of the imaginary surfaces required to maintain Category II instrument landing system capabilities, but no action would be taken to ensure clearance of the lower imaginary surfaces and other imaginary surfaces required in UFC 3-260-01 or FAR Part 77. Vegetation in the BRL and CZs on DMAFB would continue to penetrate the imaginary surfaces associated with the runway system. Continued growth of heavy vegetated areas near the runways would result in a steadily increasing number of obstructions penetrating the surfaces defined in UFC 3-260-01 and FAR Part 77. To ensure safe aircraft operation and conform to USAF and FAA guidance, the USAF would have to curtail or discontinue flight operations at DMAFB. Despite the fact that No Action Alternative would best preserve the natural features and vegetation of the Sonoran Desert, it would place severe limitations on the operation of aircraft critical to the DMAFB mission.

3.0 SUMMARY OF ENVIRONMENTAL EFFECTS

3.1 Air Quality

Proposed Action. Construction activities associated with the proposed action would be below *de minimis* levels, would not cause a violation of the national ambient air quality standards, and would not require a full Conformity Determination. Therefore, no significant direct or indirect effects on regional or local air quality would result from implementation of the proposed action. Special measures must be taken to reduce fugitive dust emissions and to comply with Pima County Environmental Quality rules and regulations.

Alternative A. Construction activities associated with Alternative A would be below *de minimis* levels, would not cause a violation of the national ambient air quality standards, and would not require a full Conformity Determination. Therefore, no significant direct or indirect effects on regional or local air quality would result from implementation of Alternative A. Because Alternative A represents less vegetation removal and associated soil disturbance, emissions are proportionately less. Particulate emissions would be approximately 35 percent lower than the proposed action in CY05 and approximately 40 percent lower in CY06. Emissions would be the same as the proposed action in CY09. Special measures must be taken to reduce fugitive dust emissions and to comply with Pima County Environmental Quality rules and regulations.

Alternative B. Construction activities associated with Alternative B would be below *de minimis* levels, would not cause a violation of the national ambient air quality standards, and would not require a full Conformity Determination. Therefore, no significant direct or indirect effects on regional or local air quality would result from implementation of Alternative B. Because Alternative B represents less soil disturbance, emissions are proportionately less. Particulate emissions would be approximately 42 percent lower than the proposed action in CY05 and approximately 40 percent lower in CY06. No emissions would occur in CY09 because the hill terrain feature would not be brought down to grade. Special measures must be taken to reduce fugitive dust emissions and to comply with Pima County Environmental Quality rules and regulations.

No Action Alternative. Under the No Action Alternative, there would be no change in or effects on air quality within Pima County.

3.2 Geological Resources

Proposed Action. Construction activities, such as grading, vegetation removal, excavation, and recontouring of the soil, would result in soil disturbance. Implementation of best management practices during construction would limit environmental consequences resulting from construction activities. No significant impact on regional or local topography or physiographic features would result from implementation of the proposed action.

Alternative A. Construction activities, such as grading, vegetation removal, excavation, and recontouring of the soil, would result in soil disturbance. Implementation of best management practices during construction would limit environmental consequences resulting from construction activities. No significant impact on regional or local topography or physiographic features would result from implementation of Alternative A.

Alternative B. Construction activities, such as grading, vegetation removal, excavation, and recontouring of the soil, would result in soil disturbance. Implementation of best management practices during construction would limit environmental consequences resulting from construction activities. No significant impact on regional or local topography or physiographic features would result from implementation of Alternative B.

No Action Alternative. Under the No Action Alternative, there would be no change in or effects on geological resources at DMAFB.

3.3 Water Resources

Proposed Action. The proposed action would result in a small decrease in the impervious surface area, which would tend to decrease the amount of runoff. Soil erosion and the sediment load in storm water are likely to increase due to the proposed alternative's removal of vegetation and replanting with native seed mix. The proposed action may also result in an increase in the velocity with which storm water drains from the project area. This can in turn increase erosion and sedimentation. However, this impact can be alleviated with proper engineering design. The proposed action involves grading and other construction activities within the 100-year floodplain on DMAFB. The USAF has prepared a FONPA demonstrating there are no practicable alternatives that would bring the proposed action into conformance with fewer impacts on floodplains. The proposed action would not substantially damage floodplain resources, would not stimulate further development in a floodplain, and is consistent with Executive Order 11988. Most of the construction activities occur in areas that are already disturbed. Adherence to best management practices and applicable codes and ordinances would reduce storm water runoff-related impacts to a level of insignificance. Erosion and sediment controls would be in place during construction to reduce and control siltation or erosion impacts on areas outside of the proposed construction sites.

Alternative A. Alternative A would have similar impacts on water resources as the proposed action. However, Alternative A would have less direct impacts on water quality than the proposed action due to a lower percentage of vegetation and soil disturbance. Alternative A would result in a small increase in the velocity and sediment content of soil runoff into surface waters surrounding the project area. In addition, maintaining a portion of the project area's vegetation would stabilize soils in the project area, resulting in less sediment runoff. Alternative A involves grading and other construction activities within the 100-year floodplain on DMAFB, requiring a FONPA.

Alternative B. Alternative B would have less direct impacts on water quality than the proposed action due to a lower percentage of vegetation and soil disturbance. Alternative B involves grading and other construction activities within the 100-year floodplain on DMAFB, requiring a FONPA.

No Action Alternative. Under the No Action Alternative, there would be no change in or effects on water resources at DMAFB.

3.4 Biological Resources

Proposed Action. The removal and modification of the current plant communities within the project area would result in vegetative changes and consequent habitat modification for a variety of wildlife species. However, the affected wildlife species are not listed by either U.S. Fish and Wildlife Service (USFWS) or Arizona Game and Fish (AGF) as threatened, endangered, or candidate species. None of the species expected to occur in the project area are listed by AGF as species of special concern. Furthermore, the area potentially affected (approximately 297 acres) is relatively small for the more vagile species such as Swainson's hawks. Special coordination in the removal and salvage of barrel and other cacti species in the project area would be done during and after construction activities. Therefore, the proposed action would not have significant impacts on vegetation; wildlife; or threatened, endangered, candidate, or special status species.

Alternative A. Alternative A would have similar impacts on biological resources as the proposed action. However, Alternative A would have less direct impacts on biological resources than the proposed action due to a lower percentage of vegetation and soil disturbance. Alternative A would disturb approximately 177 acres of vegetation on DMAFB. Alternative A would not have significant impacts on vegetation; wildlife; or threatened, endangered, candidate, or special status species.

Alternative B. Alternative B would have similar impacts on biological resources as the proposed action. However, Alternative B would have less direct impacts on biological resources than the proposed action due to a lower percentage of vegetation and soil disturbance. Alternative B would disturb approximately 177 acres of vegetation on DMAFB. Alternative B would not have significant impacts on vegetation; wildlife; or threatened, endangered, candidate, or special status species.

No Action Alternative. No measures would be taken to bring DMAFB into conformance with UFC 3-260-01 or FAR Part 77. Vegetation would continue to be trimmed as necessary to prevent penetration of the imaginary surfaces required to maintain Category II instrument landing system capabilities, but no action would be taken to ensure clearance of the lower imaginary surfaces and other imaginary surfaces required in UFC 3-260-01 or FAR Part 77. The No Action Alternative would have no significant impact on the native vegetation, wildlife populations, or to species designated as threatened, endangered, or candidate species by USFWS, or as species of special concern by AGF.

3.5 Hazardous Materials and Wastes Management

Proposed Action. There would be no significant impacts on hazardous materials and wastes management due to implementation of the proposed action. Minor hazardous materials and wastes would be generated during project construction. In addition, the proposed action is within or in close proximity to three open Environmental Restoration Program (ERP) sites. Because of the potential threat of contamination from ERP sites during construction, it is recommended that a health and safety plan be prepared in accordance with Occupational Safety and Health Administration (OSHA) requirements prior to commencement of construction activities. In addition, should contamination be encountered, handling, storage, transportation, and disposal activities would be conducted in accordance with applicable federal, state, and local regulations, USAF instructions, and DMAFB programs and procedures. While working within

ERP sites, workers should either be 40-hour Hazardous Waste Operations and Emergency Response trained, or should be overseen by a supervisor with OSHA Site Supervisor certification.

Alternative A. Alternative A would have the same impacts as the proposed action to hazardous materials, hazardous wastes, asbestos and lead-based paint, pollution prevention, and ERP.

Alternative B. Alternative B would have the same impacts as the proposed action to hazardous materials, hazardous wastes, asbestos and lead-based paint, pollution prevention, and ERP.

No Action Alternative. Under the No Action Alternative, there would be no change in or effects on hazardous materials and wastes management at DMAFB.

3.6 Infrastructure

Proposed Action. If dust control methods are not used prior, during, and after construction, the proposed action could have an adverse affect on base mission operations. However, if these methods are used, there would be no adverse impact to airfield operations from the proposed action. The proposed action would not have an adverse impact on transportation, storm water, and liquid fuels systems. In addition, the proposed action at DMAFB would not impact the solid waste management program at the base or the capacity of surrounding landfills.

Alternative A. Alternative A would have the same impacts as the proposed action to airfield, transportation systems, liquid fuel systems, storm water systems, and solid waste management.

Alternative B. Alternative B would have the same impacts as the proposed action to airfield, transportation systems, liquid fuel systems, storm water systems, and solid waste management.

No Action Alternative. Under the No Action Alternative, there would be no change in or effects on infrastructure at DMAFB.

3.7 Safety

Proposed Action. There would be no significant impacts on structure or personnel safety due to implementation of the proposed action. Implementation of the proposed action would slightly increase the short-term risk associated with construction contractors performing work at DMAFB during the normal workday because the level of such activity would increase. In addition, construction workers could be exposed to buried unexploded ordnance and hazardous wastes during project construction. Construction workers would have the project area surveyed and obtain a waiver from Headquarters Air Combat Command prior to commencement of construction activities. The proposed action would also provide a beneficial direct impact on the base by improving airfield safety and bring the airfield into compliance with UFC and FAR standards.

Alternative A. Alternative A would have the same impacts as the proposed action on construction worker, aircraft, and personnel safety.

Alternative B. Alternative B would have the same impacts as the proposed action on construction worker, aircraft, and personnel safety.

No Action Alternative. Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. However, the safety of aircraft and base personnel could be compromised and the DMAFB would remain out of compliance with UFC 3-260-01 and FAR Part 77

standards. To ensure safe aircraft operation and conform to USAF and FAA guidance, the USAF would have to curtail or discontinue flight operations at DMAFB.

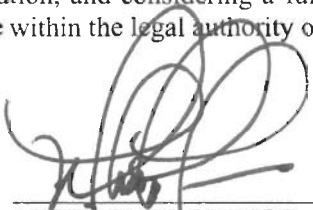
4.0 CONCLUSION

Based on the provisions set forth in the proposed action, Alternative A, and Alternative B all activities were found to comply with the criteria or standards of environmental quality and coordinated with the appropriate Federal, state, and local agencies. The attached Environmental Assessment (EA) and a draft of this FONSI/FONPA were made available to the public on 28 February 2005 for a 30-day review period. All public and agency comments received were addressed in the EA.

FINDINGS

FONPA. Reasonable alternatives were considered, but no other alternative to the proposed action meets the safety or operational requirements of the 355th Wing. Pursuant to Executive Orders 11988 and 11990 and the authority delegated by Secretary of the Air Force Order 791.1, and taking the above information into account, I find that there is no practicable alternative to this action and that the proposed action includes all practicable measures to minimize harm to the environment. This decision has been made after taking into account all submitted information, and considering a full range of practical alternatives that would meet project requirements and are within the legal authority of the USAF.

FONSI. After review of the EA prepared in accordance with the requirements of the National Environmental Policy Act, the Council on Environmental Quality regulations, and *Environmental Impact Analysis Process*, 32 CFR Part 989, as amended, I have determined that the proposed action would not have a significant impact on the quality of the human or natural environment. An Environmental Impact Statement will not be prepared. This decision has been made after taking into account all submitted information, and considering a full range of practical alternatives that would meet project requirements and are within the legal authority of the USAF.



MICHAEL W. SPENCER, Colonel, USAF
Commander, 355th Wing



Date

**ENVIRONMENTAL ASSESSMENT OF
REMOVE OBJECTS ALONG FLIGHTLINE AT
DAVIS-MONTHAN AIR FORCE BASE, ARIZONA**

**Davis-Monthan Air Force Base
Environmental Quality Flight
5825 E. Madera Street
Davis-Monthan Air Force Base, AZ 85707-4927**

AUGUST 2005

**COVER SHEET
ENVIRONMENTAL ASSESSMENT OF
REMOVE OBJECTS ALONG FLIGHTLINE AT
DAVIS-MONTHAN AIR FORCE BASE, ARIZONA**

Responsible Agencies: U.S. Air Force (USAF), Air Combat Command (ACC), and 355th Wing (355 WG), Davis-Monthan Air Force Base (DMAFB), Arizona.

Affected Location: DMAFB, Arizona

Report Designation: Environmental Assessment (EA)

Proposed Action: To ensure the safety of flight operations, runways at USAF installations such as DMAFB must comply with Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design* (November 2001) and with the Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*. These documents establish standards for determining obstructions to air navigation and apply to existing and proposed man-made objects, objects of natural growth, and terrain. Both these documents require that all man-made and natural objects be removed from an expanded zone (1,000 feet from runway centerline and within the safety clearance zones at each end of the runway) around the flightline (Runway 12/30, taxiways, and aprons). Four alternatives will be evaluated as part of the EA: (1) Proposed Action (completely remove vegetation and remove all structures that do not qualify for waivers), (2) Alternative A (selectively remove vegetation, grade key areas, and remove all structures that do not qualify for waivers), (3) Alternative B (same as Alternative A except perimeter/Columbia Drive and the hill terrain feature would not be demolished and brought down to grade), and (4) No Action Alternative. This EA has been prepared to evaluate the Proposed Action, the Alternatives, and the No Action Alternative. Resources that are considered in the impact analysis are air quality, geological resources, water resources, biological resources, hazardous materials and wastes management, infrastructure, and safety. The Notice of Availability was published in the *Desert Airman* on 4 February 2005 and the EA and Draft Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA) were made available for public and agency review. No public comments were received and one agency comment was received during the 30-day review period.

**ENVIRONMENTAL ASSESSMENT OF
REMOVE OBJECTS ALONG FLIGHTLINE AT
DAVIS-MONTHAN AIR FORCE BASE, ARIZONA**

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1. Purpose of and Need for the Proposed Action

1.1 Background

Davis-Monthan Air Force Base (DMAFB) is a United States Air Force (USAF) base under the Air Combat Command (ACC). DMAFB is headquarters to the 355th Wing (355 WG). The 355 WG provides support for DMAFB, ranging from financial, personnel, housing, maintenance, legal, recreational, and medical needs to fire protection, chaplain services, and base security.

To ensure the safety of flight operations, runways at USAF installations such as DMAFB must comply with Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design* and with the Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*. These documents establish standards for determining obstructions to air navigation and apply to existing and proposed man-made objects, objects of natural growth, and terrain. Both these documents require that all man-made and natural objects be removed from an expanded zone (1,000 feet from runway centerline and within the safety clearance zones [CZs] at each end of the runway) around the flightline.

In January 2000, the USAF Chief of Staff directed formation of a USAF tiger team to address the reduction of airfield obstructions. To facilitate this effort, the Deputy Chiefs of Staff for Operations, Safety, and Civil Engineering directed that major commands (MAJCOM) provide a listing of airfield obstructions at their bases, along with a cost estimate to remove them. Because many of the obstructions listed were high-cost facilities that were constructed under previous less-stringent standards, and, therefore, were exempt from compliance with current standards, Headquarters (HQ) USAF issued a policy memorandum directing that Building Restriction Lines (BRLs) be established at the predominant line and height of flightline facilities at each base. This policy memorandum also authorized further development within the boundaries established by the BRLs without waiver. The plan and profile views of a typical BRL are shown in Figure 1-1.

This Environmental Assessment (EA) analyzes DMAFB's Proposed Action, Alternative A, Alternative B, and the No Action Alternative. If the analyses presented in the EA indicate that implementation of the Proposed Action would not result in significant environmental impacts, a Finding of No Significant Impact (FONSI) would be prepared. A FONSI briefly presents why a

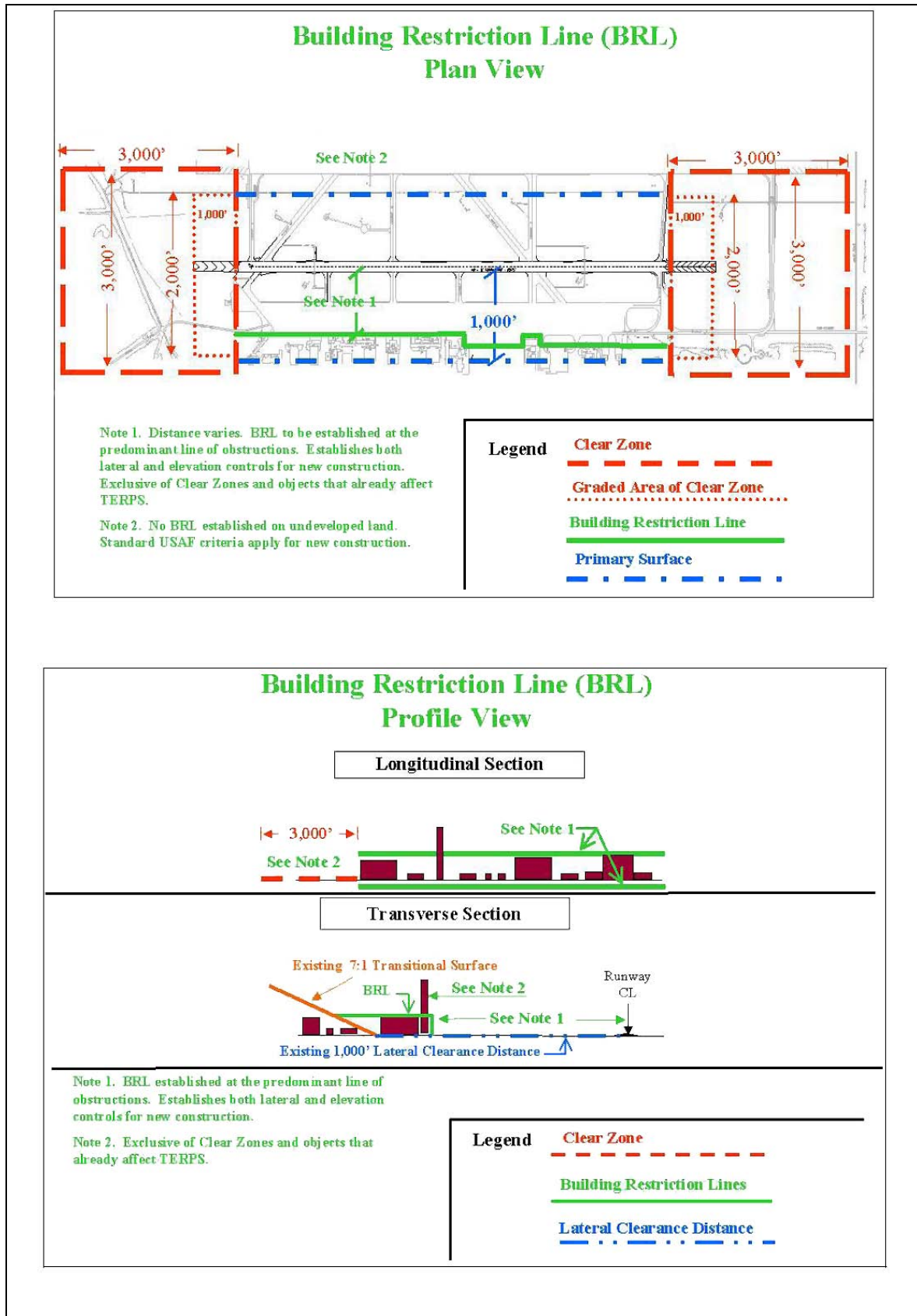


Figure 1-1. Building Restriction Line Plan and Profile Views

Proposed Action would not have a significant effect on the human environment and why an Environmental Impact Statement (EIS) is unnecessary. If significant environmental issues result that cannot be mitigated to insignificance, an EIS would be required, or the Proposed Action would be abandoned and no action would be taken.

Based on the analysis in the EA, 355 WG, as the decision-maker, will decide whether there are significant adverse environmental impacts associated with the removal of objects along the flightline at DMAFB. Based on the review of the analysis, the 355 WG would either prepare a FONSI or recommend the analysis proceed to an EIS.

1.2 Purpose and Need of the Proposed Action

DMAFB has one runway surface: a northwest-to-southeast-oriented runway of approximately 13,645 linear feet. The end of each runway is identified by the whole number nearest one-tenth the magnetic azimuth of the runway centerline when viewed from the direction of approach. For example, a runway end with an approach azimuth of 332 degrees would be designated Runway 33. For DMAFB, the southeast end of the shorter runway is designated 30 with the other end designated 12. For the purposes of this EA, the runway area will be denoted by its orientation.

Currently, vegetation, soil berms, and structures intrude into the controlled airspace at DMAFB as defined by the UFC 3-260-01 for Class B USAF runways. An airfield survey in December 2002 revealed that vegetation, soil berms, and structures penetrate into the CZ graded areas (GAs), approach-departure clearance surfaces (A/DSs), and transitional surfaces (TSs) (as defined in UFC 3-260-01) for Runway 12/30.

The direct elimination of threats to air navigation at DMAFB is a USAF and Federal Aviation Administration (FAA) requirement. Removal of airfield obstacles is necessary to maintain DMAFB's critical airlift mission and to bring the base into compliance with applicable USAF and FAA airfield criteria as set forth in UFC 3-260-01 and FAR Part 77.

The objective of the Proposed Action is to protect lives and USAF property, maximize the safety and efficiency of runway operations, meet constant availability standards of an unrestricted approach during landing procedures, and maintain precision landing capability for all aircraft operations at DMAFB.

1.3 Airfield Design Criteria for DMAFB

As noted earlier, airfield design and layout must comply with the UFC 3-260-01 and FAR Part 77, which regulate and ensure safe aircraft operations. A description of airspace surfaces is provided below.

Primary Surface (PS). This surface defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. The PS comprises runway surfaces, runway shoulders, and lateral safety zones. Length of the PS includes the runway length and extends 200 feet beyond the end of the runway. For Class B runways, the width of the PS is 2,000 feet (1,000 feet on each side of centerline).

Clear Zone (CZ). This surface defines the limits of the obstruction clearance requirements in the vicinity contiguous to the PS. The CZ is a 3,000 by 3,000-foot area centered on centerline at the end of a runway.

Graded Area (GA). The GA denotes an area within the CZ, measuring 1,000 feet in length beyond the primary surface and by the established width of the PS (2,000 feet wide for Class B). The GA must be clear of any obstructions such as above-ground structures (except essential navigational aids), trees, stumps, roadways, and ditches. The GA provides aircraft a clear and relatively smooth area if problems are encountered during landing or take-off. The only structures allowed in the GA are navigational aids such as approach lights, runway and taxiway lighting systems, and other such structures directly related to essential operational requirements.

Approach-Departure Clearance Surface (A/DS). This surface is a symmetrical imaginary trapezoid plane that begins 200 feet past the end of the runway, and represents the approach-departure “glide angle” for an airfield. The width of this surface at the end of runway is 2,000 feet, and it flares uniformly to a width of 16,000 feet at a distance of 50,000 feet. This plane rises 1 foot vertically for every 50 feet horizontally (50H:1V glide angle).

Transitional Surface (TS). These surfaces connect the PS, CZ, and A/DS to other outer horizontal flight surfaces (not within the scope of this document). The TS begins at the lateral boundary of the primary surface, and then slopes upward 1 foot vertically for every 7 feet horizontally (7:1) at right angles to the runway centerline. The elevation of the runway centerline is the elevation from the beginning of the 7:1 slope.

Accident Potential Zone (APZ). UFC 3-260-01 establishes three successive APZs: the CZ (3,000 feet by 3,000 feet), the APZ I (5,000 feet by 3,000 feet), and APZ II (7,000 feet by 3,000 feet). These zones were established from mishap probabilities based on past USAF crash patterns, with the CZ having the highest accident potential of the three zones.

Airfield Surface Overlap. The A/DS and the TS are three-dimensional surfaces and there is overlap between the two of them and the CZ. Figure 1-2 shows the Class B Runway end and CZ details and Figure 1-3 shows Class B Runway airspace plan and profile runway imaginary surfaces.

1.4 Airfield Waivers

Airfield waivers represent a deviation from normal airfield standards. The Wing Commander may approve temporary waivers required for construction activities. However, only MAJCOM has the ability to authorize permanent waivers for obstructions including natural geographic features or obstructions whose removal is impractical. Trees are a permissible deviation within a CZ outside of the GA if their maximum height is 10 feet below the 50H:1V A/DS or 7H:1V TS.

1.5 Location

DMAFB is within the Tucson Basin, on the southeastern Tucson city limits (Figure 1-4). DMAFB is situated on a high valley floor at an elevation of approximately 2,600 feet above sea level in the Sonoran Desert of southern Arizona. DMAFB and the city of Tucson are surrounded by five mountain ranges. The clear, sunny skies and hot, dry weather, which typifies the vast majority of days in southern Arizona, make DMAFB an ideal environment for USAF flight training, while simultaneously serving as a long-term storage and maintenance facility for aircraft. DMAFB occupies 10,633 acres of Pima County within the city limits of Tucson.

1.6 Summary of Key Environmental Compliance Requirements

1.6.1 National Environmental Policy Act

The National Environmental Policy Act, commonly known as NEPA, is a Federal statute requiring the identification and analysis of potential environmental impacts of proposed Federal actions before those actions are taken. NEPA established the Council on Environmental

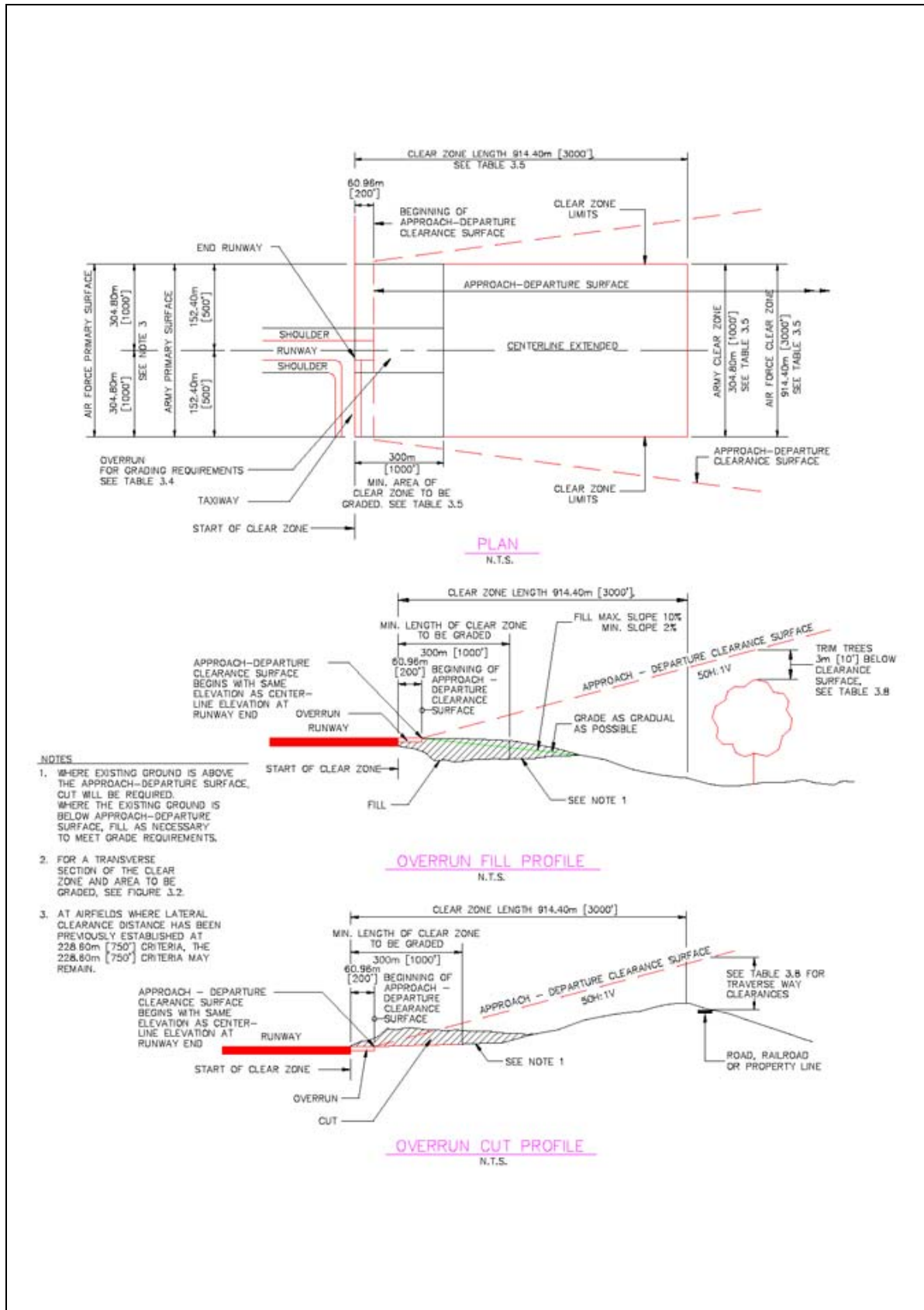


Figure 1-2. Class B Runway End and Clear Zone Details

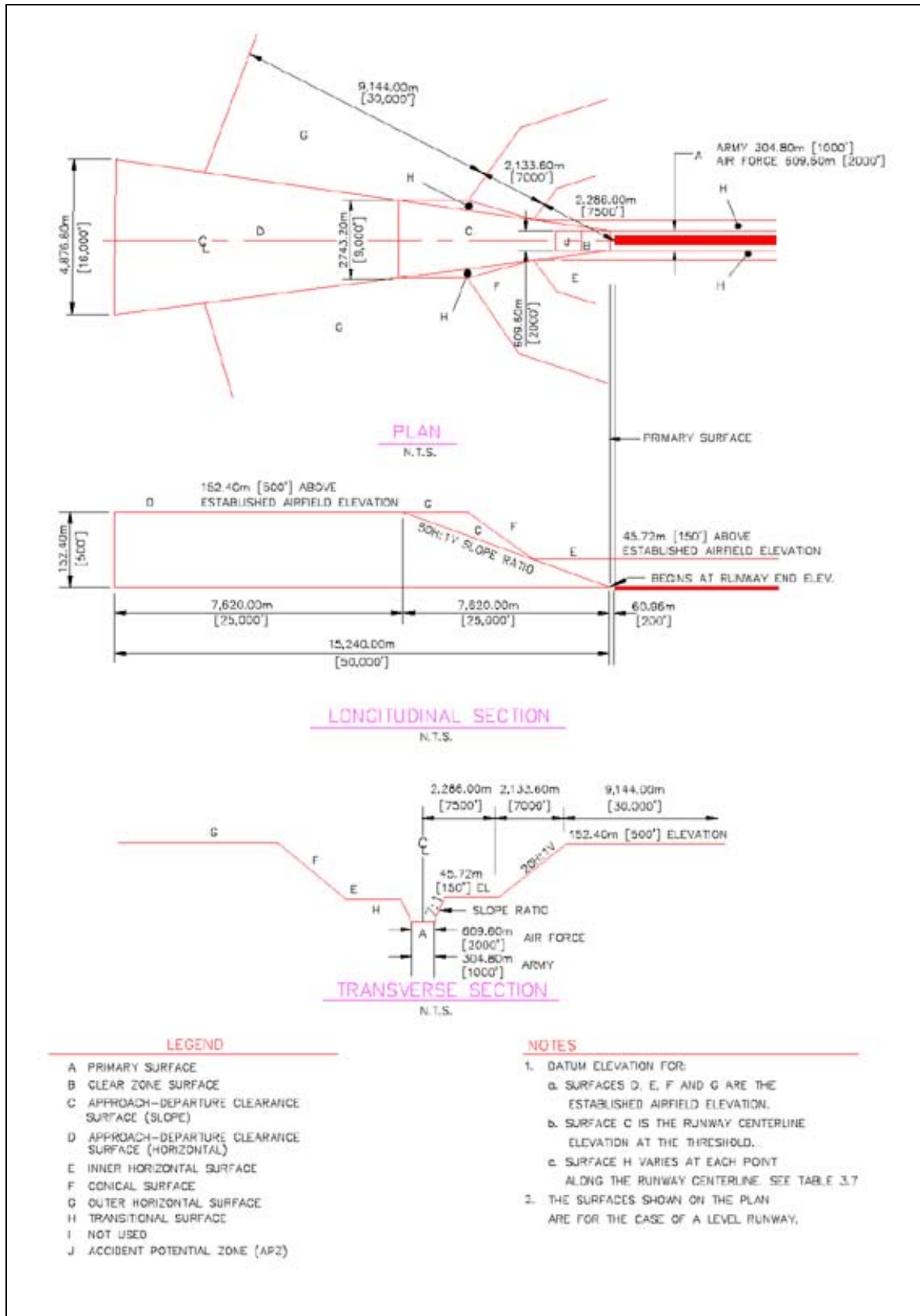


Figure 1-3. Class B Runway Airspace Plan and Profile Runway Imaginary Surfaces

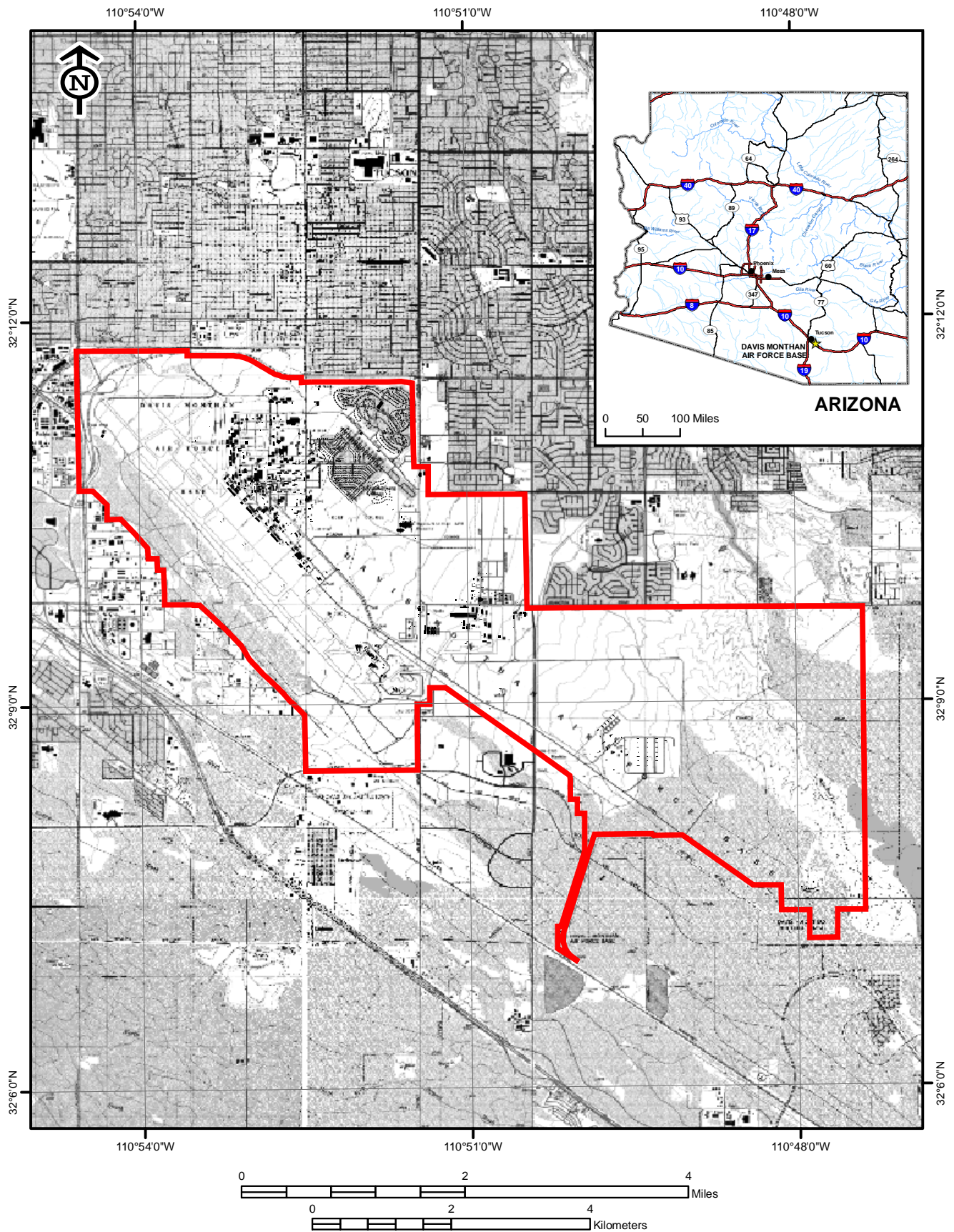


Figure 1-4. Davis-Monthan AFB and Surrounding Area

Quality (CEQ) that is charged with the development of implementing regulations and ensuring agency compliance with NEPA. CEQ regulations mandate that all Federal agencies use a systematic interdisciplinary approach to environmental planning and the evaluation of actions that might affect the environment. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions.

The process for implementing NEPA is codified in Title 40 Code of Federal Regulations (CFR) 1500-1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. The CEQ was established under NEPA to implement and oversee Federal policy in this process. CEQ regulations specify the following must be accomplished when preparing an EA:

- Briefly provide evidence and analysis for determining whether to prepare an EIS or a FONSI.
- Aid in an agency's compliance with NEPA when an EIS is unnecessary.
- Facilitate preparation of an EIS when one is necessary.

Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*, states that the USAF will comply with applicable Federal, state, and local environmental laws and regulations, including NEPA. The USAF's implementing regulation for NEPA is *The Environmental Impact Analysis Process (EIAP)*, 32 CFR 989, as amended.

1.6.2 Integration of Other Environmental Statutes and Regulations

To comply with NEPA, the planning and decision-making process for actions proposed by Federal agencies involves a study of other relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or EIS, which enables the decision-maker to have a comprehensive view of major environmental issues and requirements associated with the Proposed Action. According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively."

The EA examines potential effects of the Proposed Action and alternatives on 11 resource areas: air quality, geological resources, water resources, biological resources, cultural resources, noise, land use, hazardous materials and wastes management, infrastructure and utilities, safety, and environmental justice and socioeconomics. The following paragraphs present examples of relevant laws, regulations, and other requirements that are often considered as part of the analysis.

Air Quality

The Clean Air Act (CAA) establishes Federal policy to protect and enhance the quality of the nation's air resources to protect human health and the environment. The CAA requires that adequate steps be implemented to control the release of air pollutants and prevent significant deterioration in air quality. The 1990 amendments to the CAA require Federal agencies to determine the conformity of proposed actions with respect to State Implementation Plans (SIPs) for attainment of air quality goals.

Water Resources

The Clean Water Act (CWA) of 1977 (33 United States Code [U.S.C.] 1344) and the Water Quality Act of 1987 (33 U.S.C. 1251, et seq., as amended) establish Federal policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters and, where attainable, to achieve a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife; and recreation in and on the water.

Executive Order (EO) 11988, *Floodplain Management*, requires Federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains. Where information is unavailable, agencies are encouraged to delineate the extent of floodplains at their site.

Biological Resources

The Endangered Species Act (ESA) requires Federal agencies that fund, authorize, or implement actions to avoid jeopardizing the continued existence of federally listed threatened or endangered species, or destroying or adversely affecting their critical habitat. Federal agencies must evaluate the effects of their actions through a set of defined procedures, which can include preparation of a Biological Assessment and formal consultation with the U.S. Fish and Wildlife Service (USFWS).

Safety

Air Force Instruction (AFI) 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program*, implements AFPD 91-3, *Occupational Safety and Health*, by outlining the AFOSH Program. The purpose of the AFOSH Program is to minimize loss of USAF resources and to protect USAF personnel from occupational deaths, injuries, or illnesses by managing risks. In conjunction with the USAF Mishap Prevention Program (AFI 91-202), these standards ensure all USAF workplaces meet Federal safety and health requirements. This instruction applies to all USAF activities, including those of the ACC.

1.6.3 Interagency and Intergovernmental Coordination for Environmental Planning

NEPA requirements help ensure that environmental information is made available to the public during the decision-making process and prior to actions being taken. The premise of NEPA is that the quality of Federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process. The Intergovernmental Coordination Act and EO 12372, *Intergovernmental Review of Federal Programs*, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal. AFI 32-7060 requires the USAF to implement a process known as Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), which is used for the purpose of agency coordination and implements scoping requirements.

Through the IICEP process, DMAFB notified relevant Federal, state, and local agencies of the action proposed and provided them sufficient time to make known their environmental concerns specific to the action. The IICEP process provided DMAFB the opportunity to cooperate with and consider state and local views in implementing the Federal proposal. Upon receipt, agency responses were provided to ACC and incorporated into the analysis of potential environmental impacts performed as part of this EA. A Notice of Availability for the EA and Draft FONSI/Finding of No Practicable Alternative (FONPA) was published in the *Desert Airman*. This was done to solicit comments on the Proposed Action and involve the local community in the decision making process. No public comments were received during this review period. Appendix A of the EA includes a copy of the IICEP letter mailed to the agencies for this action, IICEP distribution list, agency responses, and Notice of Availability.

1.7 Introduction to the Organization of this Document

This EA is organized into six sections. Section 1 contains background information, a description of the purpose of and need for the Proposed Action, the location of the Proposed Action, a listing of applicable regulatory requirements, and an introduction to the organization of the EA. Section 2 provides an introduction to the Proposed Action, the mission of the base, selection criteria for alternatives, a detailed description of the Proposed Action, a description of the No Action Alternative, alternatives to the Proposed Action, alternatives considered but eliminated from further consideration, and identification of other actions occurring in the region of influence. Section 3 contains a general description of the biophysical resources and baseline conditions that potentially could be affected by the Proposed Action or the No Action Alternative. Section 4 presents an analysis of the direct and indirect environmental consequences. Section 5 includes an analysis of the potential cumulative impacts on DMAFB. Section 6 lists the preparers of the document, and Section 7 lists the sources of information used in the preparation of the document. Appendix A of the EA includes a copy of the IICEP letter mailed to the agencies for this action, the IICEP distribution list, agency comments, and the Notice of Availability. Appendix B of the EA contains the Biological Field Survey Report conducted for the Proposed Action. Appendix C includes details of air quality emissions calculations.

2. Description of Proposed Action and Alternatives

2.1 Introduction

This section describes the Proposed Action, Alternative A, Alternative B, No Action Alternative, alternatives considered but eliminated from further discussion, the decision to be made, and identification of the preferred alternative.

2.2 Current DMAFB Mission

DMAFB is the home of the 355 WG, an important element of ACC. The 355 WG's operational mission is to "Provide close air support, forward air liaison for Army forces, command and control, radar surveillance and control, and combat support forces to Unified Commander-in-Chiefs (CINC); conduct initial and re-qualification training for all A/AO-10 and EC-130 pilots and crews; and ensure Intermediate-Range Nuclear Forces (INF), Strategic Arms Reduction Treaty (START), Chemical Weapons Convention and Open Skies treaty compliance."

The primary mission of the 355 WG is to provide CINCs with worldwide, deployable, combat-ready A-10 close air support, OA-10 forward air controller support, command and control warfare capability, airborne battlefield air attack management, and early warning surveillance and radar control of combat aircraft near the forward battle area. DMAFB is also the home of Detachment 1, 120 Air National Guard (ANG) Fighter Intercept Group (FIG). The mission of this group is to scramble their F-16 aircraft in less than 5 minutes to identify, intercept, and, if necessary, destroy any airborne threat to U.S. security.

As the host unit at DMAFB, the 355 WG is also responsible for providing base operations, logistical and administrative support to all personnel and units on the base, and certain on-base services and facilities that are common to the Wing and tenant organizations. These include the fire department, fuel storage area, base operations, and service for transient aircraft.

2.3 Selection Criteria for Alternatives

DMAFB identified the following criteria for evaluating alternatives:

- Eliminates hazards to air navigation due to obstructions.
- Does not interfere with critical airlift missions.

- Meets applicable airfield criteria for Class B USAF runways as established in UFC 3-260-01 and FAR Part 77.
- Provides for the constant availability of an unrestricted approach during landing procedures.
- Does not diminish the efficiency of runway operations.
- Minimizes disturbance to natural areas and wildlife habitat.
- Complies with applicable Federal and state laws to protect the environment.
- Economically feasible.

2.4 Proposed Action

A Site Activation Task Force (SATAF) meeting was conducted at DMAFB in February 2003 to identify all of the necessary actions to support the proposed removal of objects along the flightline at DMAFB. This section describes the alternatives DMAFB is analyzing to accomplish the Proposed Action and presents the No Action Alternative, as prescribed by CEQ regulations. The Proposed Action would reduce the aircraft safety obstacles within the flightline area that would enable 355 WG aircrews to complete their missions and ensure that safety requirements for aircraft and personnel on DMAFB are met and sustained.

If current flight operations at DMAFB are to continue, immediate action is needed to eliminate heavy and tall vegetation and remove facilities and infrastructure that have become flight obstructions to bring the runways into conformance with airspace clearance requirements specified in UFC 3-260-01 and FAR Part 77. The elimination of obstructions to air navigation at DMAFB is both a USAF and an FAA requirement.

A memorandum, dated February 14, 2000, from the HQ USAF acknowledges the urgent need to eliminate hazards to air navigation at USAF installations nationwide. The memorandum states that airfield design and layout must comply with UFC 3-260-01 and FAR Part 77. Failure to maintain proper, obstacle-free, clearances of airspace in and around DMAFB has forced the USAF to implement waivers to both FAA and USAF flight safety criteria. Waivers may be granted for obstacles to air navigation on a temporary basis. Temporary waivers are for a specified period during which additional actions to mitigate the danger must be initiated and maintained until the hazard can be corrected. For example, a temporary waiver has been granted for airfield lighting within the CZs of Runway 12/30 and for relocating an existing Hazardous Cargo Pad near Runway 30. These projects were covered by previous EAs and categorical

exclusions to comply with UFC 3-260-01 and FAR Part 77. To comply with FAA and USAF standards, as well as to avoid emergency responses, expeditious action is required to bring the project area into compliance with UFC 3-260-01 and FAR Part 77 requirements.

The Proposed Action consists of four parts:

- Obtain permanent airfield waivers for objects that will remain within the BRLs and CZs and that meet the minimum requirements specified in UFC 3-260-01 and FAR Part 77.
- Obtain temporary airfield waivers for objects that cannot be immediately brought into compliance with UFC 3-260-01 and FAR Part 77 regulations because of budget and mission constraints.
- Demolish or relocate all objects within the BRLs and CZs that do not qualify for a permanent airfield waiver.
- Remove vegetation by grading all vegetated areas within the BRLs and CZs according to the requirements specified in UFC 3-260-01 and FAR Part 77.

2.4.1 Obtain Permanent Airfield Waivers For Objects That Fall Within BRLs and CZs

Existing Facilities. The criteria in UFC 3-260-01 are not intended to apply to existing facilities located or constructed under previous standards. These facilities can continue to be used without impairing operational efficiency and safety; however, USAF bases must identify such facilities on airfield obstruction maps using a BRL to encompass exempt areas or an annotation on or near the feature noting its exempt status. The BRL is defined as “a line which identifies suitable building area locations on airports.”

Modification of Existing Facilities. When existing airfield facilities are modified, construction must conform to the criteria established in UFC 3-260-01 unless an airfield waiver is obtained. Modified portions of facilities must be maintained at a level that will sustain compliance with current standards.

New Construction. The criteria established in UFC 3-260-01 apply to all new facilities. All new construction must comply with criteria established in UFC 3-260-01 unless appropriate waivers are obtained. For the USAF, new facilities within the appropriate category code may be constructed without waiver if they are behind and beneath the boundaries of the BRL.

Table 2-1 lists all objects within the BRLs and CZs identified by the airfield surveillance team in 2002 that could qualify for a permanent airfield waiver. Figure 2-1 shows the geographical relationship of these objects in relation to the BRLs and CZs.

Table 2-1. Objects Within the BRLs and CZs Qualifying for a Permanent Airfield Waiver

No.	Object Description	No.	Object Description
1	Facility 8030 (Heritage Hangar)	17	Facility 313 (TACAN Tower)
2	Facility 225 (Engine Test Cell Office)	18	Facility 140 (41 ECS Squadron Operations)
3	Facilities 92 and 97 (Guard Shacks)	19	Facility 136 ("V" Ramp Maintenance Shop)
4	Facility 4847 (Nose Docks)	20	Facility 2275 (AN-TMQ-11)
5	Facility 4810 (Equipment Maintenance Squadron)	21	Facilities 4809, 5251, 5430, and 5607 (A10 Hangars)
6	Facility 5423 (Component Repair Squadron)	22	Lights for Trim Pad #1
7	Facility 4857 (POL)	23	Fuel Fill Stand (West Ramp)
8	UHF Antenna at Facility 140 (41 ECS)	24	Arm/Disarm Shelters
9	Facility 306 (Control Tower)	25	Gun Clearing Structure
10	Facility 139 (Aircraft Maintenance Shop) and Facility 145 (C130 Parts Store)	26	Facilities 13600 and 13601 (Precision Approach Path Indicator System)
11	Facility 83120 (Soil Vapor Extraction Unit)	27	Facility 13201 (Glide Slope Near Field Monitor)
12	Facility 139 Ramada	28	Facility 67 (Well No. 17)
13	AN/GPN-22 (PAR Reference Reflectors)	29	Facility 4844 (79 RQS Hangar)
14	Facilities 205, 206, 207, and 209 (Fuel Pump Houses)	30	Facility 128 Security Fence
15	Facility 202 (Fuel Pump House and Signs)	31	Facility 146 (Security Force Entry Control)
16	Fire Phones on Posts (West Ramp)		

Source: 355 OSS/OSAA

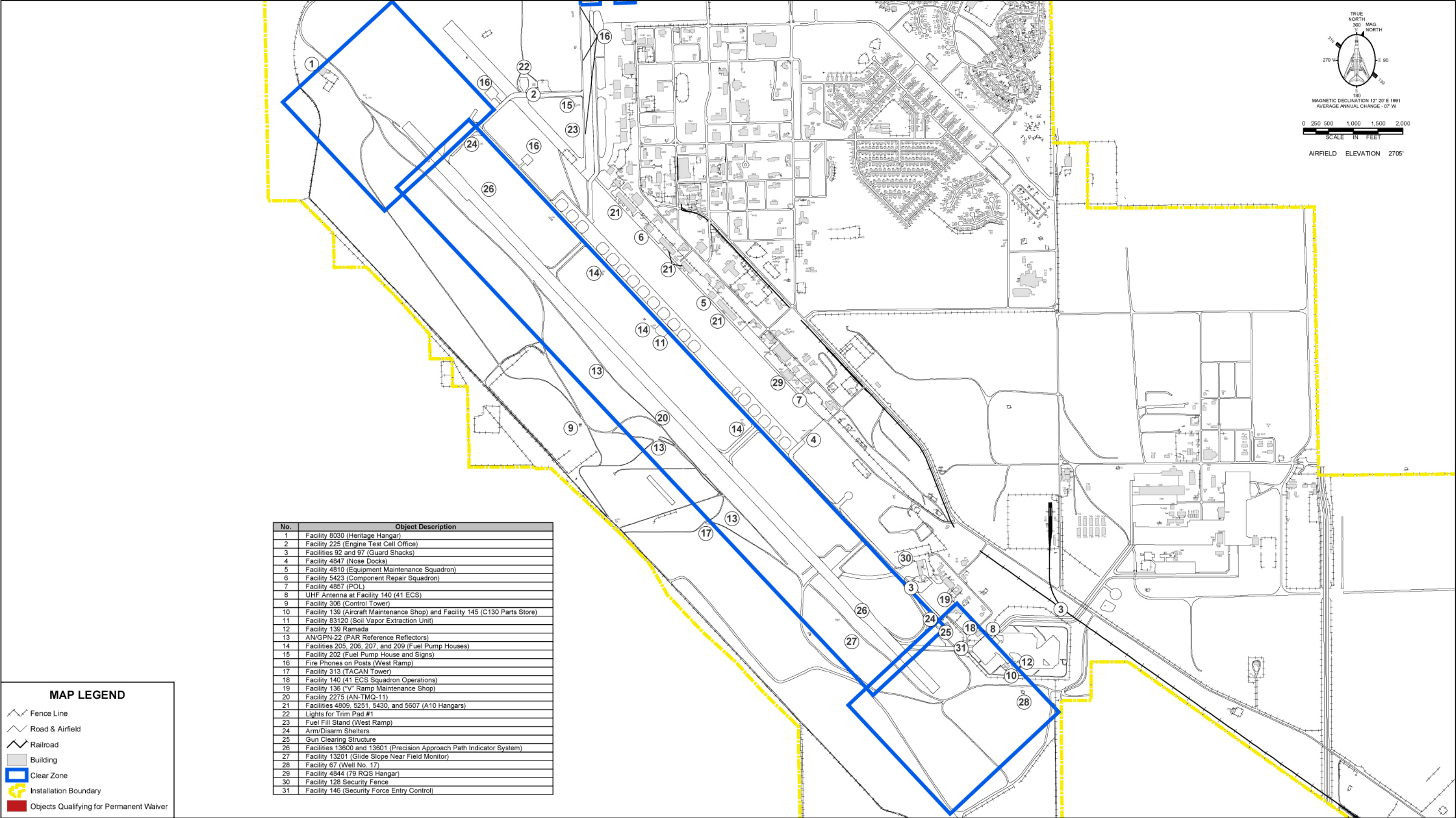


Figure 2-1. Objects Within the BRLs and CZs Applying for a Permanent Waiver

2.4.2 Demolish or Relocate Objects That Fall Within BRLs and CZs

Table 2-2 lists all objects within the BRLs and CZs identified by the airfield surveillance team in 2002 that do not meet the minimum qualifications specified in UFC 3-260-01 and FAR Part 77. Some of these structures would qualify for a temporary airfield waiver and others would be relocated or repaired. Figure 2-2 shows the geographical relationship of these objects to the BRLs and CZs.

Table 2-2. Objects Within the BRLs and CZs Deviating From UFC 3-260-01 and FAR Part 77 Regulation Requirements

No.	Object Description	Program Fiscal Year	Hazard Ranking	Corrective Action/Current Situation
1	Columbia Drive and Ditch	2005	High	Demolish Columbia Drive and relocate outside PS. Grade ditch to comply with requirements in UFC. Limit personnel along road and obtain temporary airfield waiver. Since the route of the new Columbia Drive is not known at this time, it will be analyzed in a separate EA in the future.
2	Glide Slope Antenna and Monitoring Unit (334)	2005	Low	Make antenna frangible and move support building. Obtain temporary airfield waiver.
3	Fire Hydrants (22)	2005	Low	Relocate fire hydrants underground. Obtain temporary airfield waiver.
4	Flightline Fence by Helipad	2005	Medium	Relocate fence outside helicopter PS and CZ. Obtain temporary airfield waiver.
5	Fuel Tank, Emergency Generator, and Storage Shed at PAR	2005	Medium	Relocate tank underground and storage shelter outside PS. Obtain temporary airfield waiver.
6	Pumphouses (201 and 204) and Equipment (203)	2005	High	Demolish facilities. Obtain temporary airfield waiver.
7	Hill (Rise in Terrain) Approach End Runway 12	2008	Low	Grade hillside to comply with grade requirements in UFC. Obtain temporary airfield waiver.
8	Primary BAK-12s Runway 12/30	2004	Low	Deck sheaves will be replaced by three-roller fairlead beams. Obtain temporary airfield waiver.
9	Culverts and Ditches	2005	Low to Medium	Demolish culverts and construct them outside CZ. Grade ditches to comply with requirements in UFC.

Source: 355 OSS/OSAA

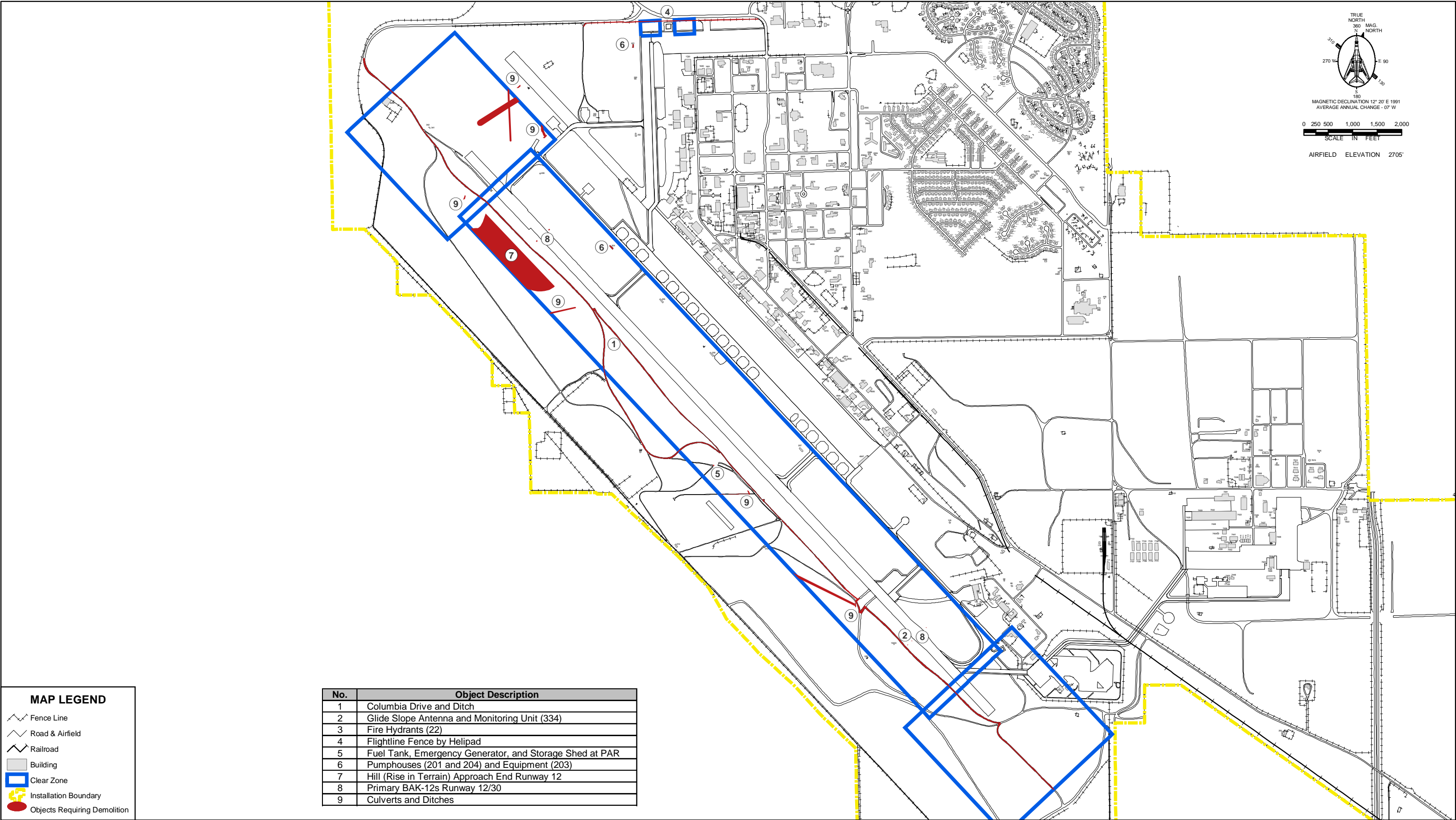


Figure 2-2. Objects Within the BRLs and CZs That Require Demolition or Relocation

2.4.3 Vegetated Areas That Require Removal to Meet UFC 3-260-01 and FAR Part 77

Approximately 297 acres of vegetation would be completely removed in the project area to reduce the safety hazard to aircraft and personnel (see Figure 2-3 and Table 2-3). After the area has been graded, it would be revegetated with a native grass seed mix that is certified to be weed-free. Revegetation would follow the guidelines provided in Appendix B as modified or enhanced by local expertise such as staff from the Natural Resources Conservation Service's (NRCS's) Tucson Field Office. All such activities in these areas would be coordinated with the 355th Environmental Quality Flight (355 CES/CEV). To ensure that the vegetation removal activities would meet air emissions standards, the Proposed Action would be accomplished over a 2-year time period. Dust control methods, such as soil stabilizers, would also be used until native vegetation is established. The area would be mowed when needed to keep all vegetation below 10 inches. Appendix B includes recommended procedures to revegetate the disturbed area. This would also include grading, reestablishing, and maintaining vegetation within 50 feet of two access roads leading to an existing helipad west of the flightline and north of the control tower (see Figure 2-3).

2.5 Alternative A

Alternative A consists of four parts:

- Obtain permanent airfield waivers for objects that will remain within the BRLs and CZs and that meet the minimum requirements specified in UFC 3-260-01 and FAR Part 77.
- Obtain temporary airfield waivers for objects that cannot be immediately brought into compliance with UFC 3-260-01 and FAR Part 77 regulations because of budget and mission constraints.
- Demolish or relocate all objects within the BRLs and CZs that do not qualify for a permanent airfield waiver.
- Remove 177 acres of vegetation by grading a portion of the BRLs and CZs according to the requirements specified in UFC 3-260-01 and FAR Part 77. All vegetation with a basal diameter greater than 2 inches would be completely removed where it presents a safety hazard to aircraft and personnel and where the vegetation penetrates the imaginary

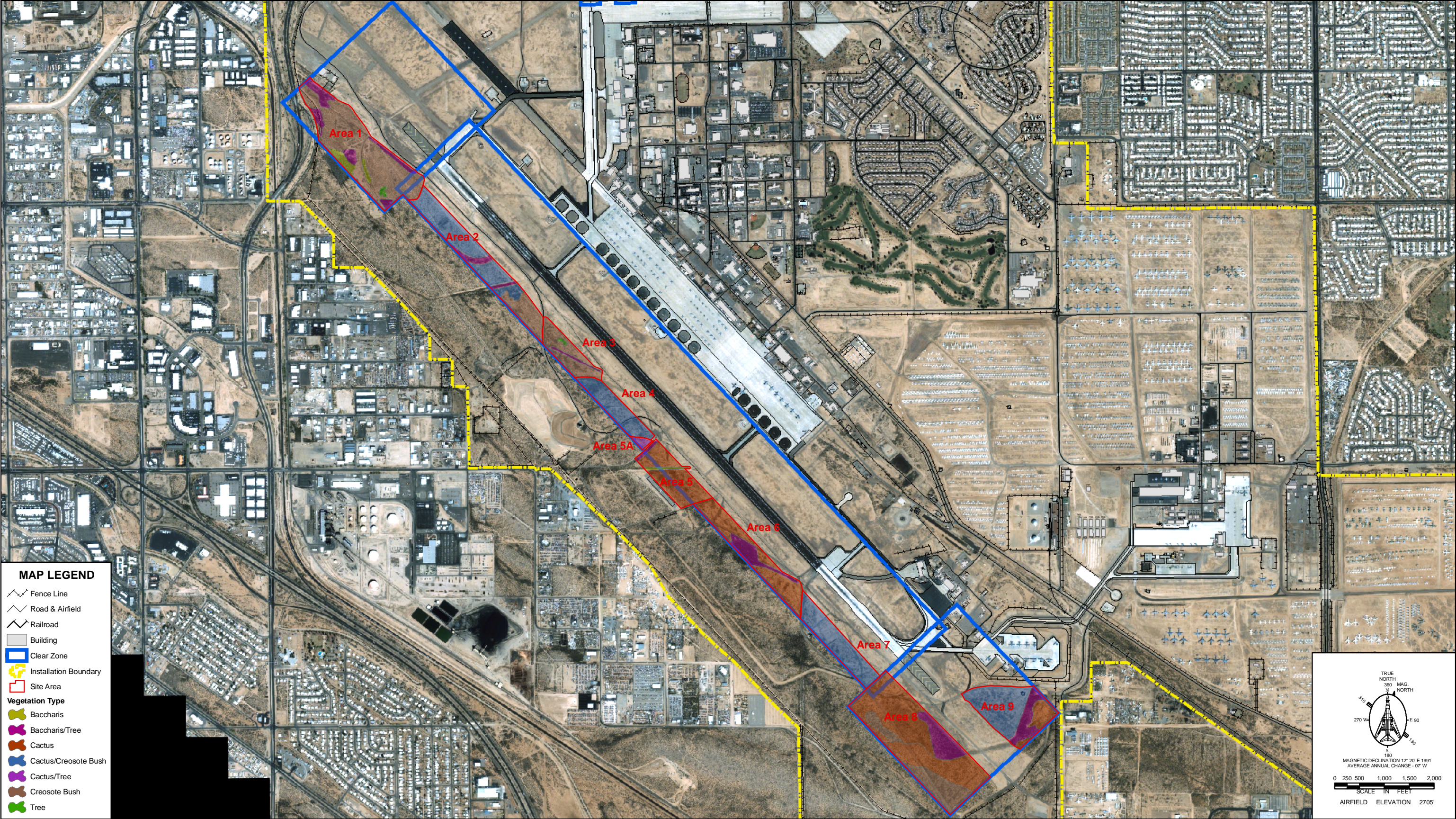


Figure 2-3. Vegetated Areas That Require Removal Within BRLs and CZs

Table 2-3. Vegetation That Would Be Removed Under Alternative A

Area Name	Vegetation Type	Acreage	Total Acreage
1	Baccharis/Tree	0.81	9.25
	Baccharis/Tree	1.47	
	Baccharis/Tree	2.05	
	Baccharis/Tree	1.75	
	Baccharis/Tree	3.17	
	Baccharis	2.59	3.51
	Baccharis	0.92	
	Tree	0.6	0.6
	Creosote Bush	43.65	43.65
	Total		57.01
2	Baccharis/Tree	0.79	3.02
	Baccharis/Tree	2.23	
	Cactus/Creosote Bush	16.51	25.14
	Cactus/Creosote Bush	5.99	
	Cactus/Creosote Bush	2.64	
	Creosote Bush	8.72	8.72
	Total		36.88
3	Baccharis/Tree	1.09	1.09
	Tree	0.34	0.34
	Creosote Bush	12.49	12.49
	Total		13.92
4	Cactus/Creosote Bush	13.91	13.91
	Total		13.91
5	Baccharis	1.03	1.03
	Cactus	13.03	18.64
	Cactus	5.61	
	Baccharis/Tree	0.97	0.97
	Total		20.64
5A	Cactus/Tree	1.35	1.35
	Total		1.35
6	Cactus	9.31	20.07
	Cactus	10.76	
	Baccharis/Tree	6.05	6.05
	Total		26.12
7	Cactus/Creosote Bush	19.82	19.82
	Total		19.82
8	Creosote Bush	12.1	15.21
	Creosote Bush	3.11	
	Cactus	20.42	50.33
	Cactus	29.91	
	Baccharis/Tree	8.83	8.83
	Total		74.37
9	Cactus	5.84	5.84
	Baccharis/Tree	6.79	6.79
	Cactus/Creosote Bush	20.34	20.34
	Total		32.97
	Cumulative Total		296.99

7H:1V TS slope ratio. All other vegetation that is within the BRLs and CZs that does not present a safety concern or does not penetrate the imaginary 7H:1V TS slope ratio would obtain a permanent airfield waiver. After these select areas have been cleared, the areas would be revegetated with a certified weed-free native grass seed mix as described above under the Proposed Action. To ensure that the vegetation removal activities would meet air emissions standards, the Proposed Action would be accomplished over a 2-year time period. Dust control methods such as soil stabilizers or other methods would also be used until native vegetation is established. These areas would be mowed when needed to keep all vegetation below 10 inches. Figure 2-3 shows the geographic location, degree of vegetation removal, and their geographic relationship to BRLs and CZs. This would include grading, reestablishing and maintaining all vegetation within 50 feet of two access roads leading to an existing helipad west of the flightline and north of the control tower (see Figure 2-3). All vegetation reduction and revegetation efforts would be coordinated with the 355 CES/CEV.

2.6 Alternative B

Alternative B consists of four parts:

- Obtain permanent airfield waivers for objects that will remain within the BRLs and CZs and that meet the minimum requirements specified in UFC 3-260-01 and FAR Part 77.
- Obtain temporary airfield waivers for objects that cannot be immediately brought into compliance with UFC 3-260-01 and FAR Part 77 regulations because of budget and mission constraints.
- Demolish or relocate all objects within the BRLs and CZs that do not qualify for a permanent waiver except for perimeter/Columbia Drive, the ditch and the hill (rise in terrain) in the PS 12 end (Objects Nos. 1 and 7; see Table 2.2). These two projects would obtain a permanent airfield waiver.
- Remove 177 acres of vegetation by grading a portion of the BRLs and CZs according to the requirements specified in UFC 3-260-01 and FAR Part 77. All vegetation with a basal diameter greater than 2 inches would be completely removed where it presents a safety hazard to aircraft and personnel and where the vegetation penetrates the imaginary 7H:1V TS slope ratio. All other vegetation that is within the BRLs and CZs that do not present a safety concern or do not penetrate the imaginary 7H:1V TS slope ratio would

obtain a permanent airfield waiver. After these select areas have been cleared, the areas would be revegetated with an approved native grass seed mix. To ensure that the vegetation removal activities would meet air emission standards, the Proposed Action would be accomplished over a 2-year time period. Dust control methods such as soil stabilizers or other methods would also be used until native vegetation is established. These areas would be mowed when needed to keep all vegetation below 10 inches. Figure 2-3 shows the geographic location, degree of vegetation removal, and their geographic relationship to BRLs and CZs. This would include grading and maintaining all vegetation within 50 feet of two access roads leading to an existing helipad west of the flightline and north of the control tower (see Figure 2-3). All vegetation reduction and revegetation efforts would be coordinated with the 355 CES/CEV. Alternative B differs from Alternative A in that the ditch and hill associated with perimeter/Columbia Drive (Objects Nos. 1 and 7; see Table 2.2), would not be brought to grade under Alternative B.

2.7 No Action Alternative

Under the No Action Alternative, no measures would be taken to bring DMAFB into conformance with UFC 3-260-01 or FAR Part 77. Vegetation would continue to be trimmed as necessary to prevent penetration of the imaginary 34-foot horizontal to 1-foot vertical (34H:1V) surface required to maintain Category II instrument landing system (ILS) capabilities (see discussion in Section 1.2.4), but no action would be taken to ensure clearance of the lower 50H:1V imaginary surface and other imaginary surfaces required in UFC 3-260-01 or FAR Part 77. Vegetation in the BRLs and CZs on DMAFB, would continue to penetrate the imaginary 50H:1V approach-departure surfaces and the 7H:1V transitional surfaces associated with the runway system. Continued growth of heavy vegetated areas near the runways would result in a steadily increasing number of obstructions penetrating the surfaces defined in UFC 3-260-01 and FAR Part 77. Permanent and temporary airfield waivers would not be obtained for the structures, and these structures would remain out of compliance with UFC 3-260-01 and FAR Part 77. To ensure safe aircraft operation and conformance to USAF and FAA guidance, the USAF would have to curtail or discontinue flight operations at DMAFB.

Although the No Action Alternative would best preserve the natural features and vegetation of the Sonoran Desert, it would place severe limitations on the operation of aircraft critical to the DMAFB mission. The No Action Alternative is therefore not a practicable and feasible alternative in the context of 40 CFR 1502.14. However, 40 CFR 1502.14(d) specifically directs

agencies preparing EISs and EAs to evaluate a No Action Alternative. The potential environmental consequences of the No Action Alternative therefore are discussed in detail in Section 4.

2.8 Alternative Considered But Eliminated From Further Review

The original project included demolishing a pre-World War II hangar (Building 8030), which is partially located within the BRL and CZ. This facility is being nominated to the National Register of Historical Places (NRHP) by the State Historic Preservation Office (SHPO). Because of the historical significance and potential listing of this facility, this alternative was dismissed.

2.9 Other Actions Occurring in the Region of Influence

Other projects that might occur within the region of influence and during the same time period as the Proposed Action are the construction of a Live Load Area near the northwest portion of the runway outside the PS and CZs, and the construction of a Hazardous Cargo Pad near the southwest portion of the runway outside of the PS and CZs.

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3. Affected Environment

Section 3.0 describes the environmental resources and conditions most likely to be affected by the Proposed Action and provides information to serve as a baseline from which to identify and evaluate environmental and socioeconomic changes likely to result from implementation of the Proposed Action. Baseline conditions represent current conditions. The potential environmental impacts of the Proposed Action, Alternatives, and the No Action Alternative on the baseline conditions are described in Section 4.0.

In compliance with NEPA, CEQ guidelines, and 32 CFR, Part 989, as amended, the description of the affected environment focuses on those resources and conditions potentially subject to impacts. Some environmental resources and conditions that are often analyzed in an EA have been omitted from this analysis. The following details the basis for such exclusions:

Cultural Resources. A pre-World War II hangar (Building 8030) is located in the project area. Building 8030 is being nominated to the NRHP by the SHPO. This historic hangar would not be impacted by the Proposed Action. No other known cultural resources or artifacts have been identified in the area of the Proposed Action, and the Proposed Action would occur in a previously disturbed area. Therefore, there would be no impact on cultural resources at DMAFB. Accordingly, the USAF has omitted detailed examination of cultural resources. If an unexpected archaeological discovery occurs during construction, the unanticipated archaeological discoveries as defined in the DMAFB Integrated Cultural Resource Management Plan (ICRMP) would be followed (DMAFB 2002). If archaeological properties are discovered, excavation and disturbance of the site would cease and the Cultural Resource Manager would be notified immediately. The Cultural Resource Manager would take actions to evaluate the discovery and provide guidance to the project engineer on any actions that should be taken to provide appropriate management treatment of the resource.

Land Use. All activities associated with the Proposed Action would be consistent with present and foreseeable land use patterns at DMAFB. Implementation of the Proposed Action would not significantly alter the existing land use at DMAFB. Accordingly, the USAF has omitted detailed examination of land use.

Noise. Implementation of the Proposed Action does not involve permanent alterations to aircraft inventories, operations, or missions. No new permanent ground-based heavy equipment operations are included in the Proposed Action. No activity included in the Proposed Action

would result in a situation where residences would be impacted by an increase to present ambient noise levels. Furthermore, noise produced by construction and demolition activities associated with the Proposed Action would be short-term and would not significantly affect sensitive receptors. The closest noise receptors are more than 0.5 miles from the project areas. Accordingly, the USAF has omitted detailed examination of noise.

Socioeconomics. The Proposed Action does not involve any activities that would directly affect off-base activities, or directly or indirectly contribute to changes in socioeconomic resources. There would be no change in the number of personnel assigned to DMAFB, and no changes in area population or associated changes in demand for housing and services. Accordingly, the USAF has omitted detailed examination of socioeconomics in this EA.

Environmental Justice. The Proposed Action does not involve any activities that would affect or contribute to changes in low-income or minority populations because all work would be performed within the base boundary. Accordingly, the USAF has omitted detailed examination of environmental justice.

3.1 Air Quality

3.1.1 Definition of Resource

Air quality in a given location is determined by the concentration of various pollutants in the atmosphere. National Ambient Air Quality Standards (NAAQS) are established by the U.S. Environmental Protection Agency (USEPA) for “criteria pollutants” including ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter equal to or less than 10 microns in diameter (PM₁₀), particulate matter equal to or less than 2.5 microns in diameter (PM_{2.5}), and lead (Pb). NAAQS represent maximum levels of background pollution in the ambient air that are considered safe, with an adequate margin of safety to protect public health and welfare (see Table 3-1).

The CAA places most of the responsibility to achieve compliance with the NAAQS on the individual states or local agencies that have been delegated CAA authority by USEPA. This is achieved through a SIP, which is required under the CAA. The SIP is a compilation of goals, strategies, schedules, permitting programs, and enforcement actions that lead the state into compliance with all NAAQS. Any changes to the compliance schedule or plan must be incorporated into the SIP and approved by USEPA. Areas not in compliance with a standard can

be declared “nonattainment areas” by USEPA or the appropriate state or local agency. Based on the severity of an area’s nonattainment (i.e., number of times that ambient air quality exceeds the NAAQS), USEPA also categorizes nonattainment areas (i.e., marginal, serious, severe, extreme). Areas designated by USEPA as being in nonattainment for one or more of the seven NAAQS may petition USEPA for redesignation as a maintenance area if they are able to demonstrate they have met the national standard for the 3 years preceding the redesignation request. At the time the state petitions USEPA for redesignation, it must also submit a revision of its SIP to provide for the maintenance of the applicable NAAQS for at least 10 years after redesignation (“maintenance plan”) pursuant to CAA §175(A).

Table 3-1. National Ambient Air Quality Standards

Pollutant	Standard Value ^b		Standard Type
Carbon Monoxide (CO)			
8-hour Average	9 ppm ²	(10 mg/m ³)	Primary
1-hour Average	35 ppm	(40 mg/m ³)	Primary
Nitrogen Dioxide (NO ₂)			
Annual Arithmetic Mean	0.053 ppm	(100 µg/m ³)	Primary and Secondary
Ozone (O ₃)			
1-hour Average ^a	0.12 ppm	(235 µg/m ³)	Primary and Secondary
8-hour Average	0.08 ppm	(157 µg/m ³)	Primary and Secondary
Lead (Pb)			
Quarterly Average		1.5 µg/m ³	Primary and Secondary
Particulate ≤ 10 micrometers (PM ₁₀)			
Annual Arithmetic Mean		50 µg/m ³	Primary and Secondary
24-hour Average		150 µg/m ³	Primary and Secondary
Particulate ≤ 2.5 micrometers (PM _{2.5})			
Annual Arithmetic Mean		15 µg/m ³	Primary and Secondary
24-hour Average		65 µg/m ³	Primary and Secondary
Sulfur Dioxide (SO ₂)			
Annual Arithmetic Mean	0.03 ppm	(80 µg/m ³)	Primary
24-hour Average	0.14 ppm	(365 µg/m ³)	Primary
3-hour Average	0.50 ppm	(1300 µg/m ³)	Secondary

Notes:

^a The ozone 1-hour standard applies only to areas that were designated nonattainment when the ozone 8-hour standard was adopted in July 1997. The new 8-hour ozone standard is being contested in Federal court. No areas have been deemed nonattainment with the new 8-hour standard pending resolution of this case.

^b Parenthetical value is an approximately equivalent concentration.

ppm parts per million

mg/m³ milligrams per cubic meter

µg/m³ micrograms per cubic meter

Under the General Conformity Rule, the CAA prohibits Federal agencies from performing projects that do not conform to a USEPA-approved SIP. In 1993, USEPA developed final rules for how Federal agencies must determine air quality conformity prior to implementing a proposed Federal action. Under these rules, certain actions are exempted from conformity determinations, while others are assumed to be in conformity if total project emissions are below *de minimis* levels established under 40 CFR 93.153. Total project emissions include both direct and indirect emissions caused by the Federal action.

3.1.2 Existing Conditions

Climate. The climate in the Tucson region is arid, with more than 300 days of sunshine. The area averages approximately 12 inches of rainfall a year. The 2 months with the most rain are July and August, usually in the form of afternoon thunderstorms. During these 2 months, there are on average 15 days of afternoon thunderstorms. Summer low temperatures average 73 degrees Fahrenheit (°F), while the average high is 98 °F. Winter averages a low of 41 °F and a high of 65 °F. Overall, the desert environment with an altitude of 2,550 to 2,900 feet above mean sea level (msl) presents a year-round mild climate (DMAFB 2000). Prevailing light winds follow a diurnal pattern blowing from the southeast during the night and early morning hours and from the northwest during the day (DMAFB 2001a).

Regional Air Quality. USEPA classifies the air quality in an air quality control region (AQCR) or in sub-areas of an AQCR according to whether the concentration of criteria pollutants in ambient air exceeds the primary or secondary NAAQS. All areas within each AQCR are therefore designated as either “attainment,” “nonattainment,” or “unclassified” for each of the six criteria pollutants. Attainment means that the air quality within an AQCR is better than the NAAQS, nonattainment indicates that air quality exceeds NAAQS, and an unclassifiable air quality designation by USEPA means that there is not enough information to appropriately classify an AQCR, so the area is considered attainment.

The General Conformity Rule requires that any Federal action meet the requirements of a SIP or Federal Implementation Plan (FIP). More specifically, CAA Conformity is assured when a Federal action *does not*

- Cause a new violation of an NAAQS.
- Contribute to an increase in the frequency or severity of violations of NAAQS.

- Delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

The conformity rule applies only to actions in nonattainment or maintenance areas and considers both direct and indirect emissions. The rule applies only to Federal actions that are considered “regionally significant” or where the total emissions from the action meet or exceed the *de minimis* thresholds. An action is regionally significant when the total nonattainment pollutant emissions exceed 10 percent of the AQCR’s total emissions inventory for that nonattainment pollutant. If a Federal action meets the *de minimis* threshold requirements and is not considered regionally significant, then a full Conformity Determination is not required.

DMAFB. Pima County Department of Environmental Quality (PDEQ) has primary jurisdiction over air quality in Pima County. The Proposed Action is in the Pima County Intrastate AQCR. The air quality in this region is designated as a maintenance area for CO and unclassifiable/attainment for all other criteria pollutants.

Pima County exceeded the Federal air pollution standards for PM₁₀ four times in 1999. PDEQ has been active in controlling fugitive dust emissions and enforcing control measures to prevent the county from becoming a nonattainment area for PM₁₀. Facilities, companies, and individuals are required to obtain an Air Quality Activity Permit from PDEQ for landscaping, earthmoving, trenching, and road construction within Pima County. Adequate control measures (Reasonably Available Control Measures for Dust Control) are mandated by PDEQ to limit excessive fugitive dust from these types of activities.

As a regulated facility, the base is required to submit actual annual emissions inventory information and compliance certificates. DMAFB is considered a major source according to the CAA Amendment Title V requirements (DMAFB 2003a).

3.2 Geological Resources

3.2.1 Definition of Resource

An area’s geological resources typically consist of surface and subsurface materials and their inherent properties. Principal factors influencing the ability of geological resources to support structural development are seismic properties (i.e., potential for subsurface shifting, faulting, or crustal disturbance), soil stability, and topography.

3.2.2 Existing Conditions

Topography. The terrain on DMAFB is generally flat, sloping from southeast to northwest. The elevation decreases from 2,950 feet to 2,550 feet. The base has two significant sloping areas: one is a highway cut for Kolb Road and the other is Atterbury Wash in the eastern part of the base. The slopes in these areas constitute constraints to development.

Geology. DMAFB is in the Tucson Basin, an intermontane trough formed between the Tucson Mountains and the Rincon and Santa Catalina mountains, all within the Sonoran Desert. The major landforms in the Sonoran Desert are desert plains, alluvial fans, and terraces.

Different episodes of volcanism, beginning in the late Jurassic Period, have contributed to the development of the Tucson Mountain range. However, the Tucson Mountains, to the west of Tucson, and the Santa Catalina and Rincon mountains, to the east and southeast of Tucson, were formed during uplift of the Basin and Ridge in the middle Tertiary Period. It is generally accepted that the Santa Catalina and Rincon mountains are slightly older than the Tucson Mountains. While the Tucson Mountains are volcanic, the surrounding mountain ranges are granitic in origin.

Regionally, the oldest rocks are isolated blocks of Paleozoic limestone. Other rock types include rhyolite tuff; early Cretaceous fine-grained siltstones, sandstones, and mudstones; Cretaceous granites; and middle Tertiary volcanics and basalts. The mountains are skirted by younger sedimentary and alluvial deposits that range from late Miocene to Quaternary Periods.

3.3 Water Resources

3.3.1 Definition of Resource

Water resources include surface water, groundwater, and floodplains. Evaluation identifies the quantity and quality of the resource and its demand for potable, irrigation, and industrial purposes.

For the purposes of this EA, floodplains are low-elevation areas that are subject to flooding from heavy rain. The risk of flooding typically hinges on local topography, frequency of precipitation events, precipitation intensity, and size of the watershed above the floodplain. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA). Flood Insurance Rate Maps (FIRMs) identify the 100-year and 500-year floodplains. The 100-year floodplain is the area that

has a 1 percent chance of inundation by a flood event in a given year. Certain facilities inherently pose too great a risk to be located in either the 100- or 500-year floodplain, such as hospitals, schools, or storage buildings for irreplaceable records. Federal, state, and local regulations often limit floodplain development to passive uses such as recreational and preservation activities to reduce the risks to human health and safety.

EO 11988, Floodplain Management, requires Federal agencies to determine whether a proposed action would occur within a floodplain. This determination typically involves consultation of the appropriate FIRM, which contains enough general information to determine the relationship of the project area to nearby floodplains. EO 11988 directs Federal agencies to avoid floodplains unless the agency determines that there is no practicable alternative. Where the only practicable alternative is to site in a floodplain, a specific step-by-step process must be followed to comply with EO 11988. This “8-step” process is detailed in the FEMA document “Further Advice on EO 11988 Floodplain Management.” The 8 steps in floodplain compliance are

1. Determine whether the action will occur in—or stimulate development in—a floodplain.
2. Receive public review/input of the Proposed Action.
3. Identify and evaluate practicable alternatives to locating in the floodplain.
4. Identify the impacts of the Proposed Action (when it occurs in a floodplain).
5. Minimize threats to life, property, and natural and beneficial floodplain values, and restore and preserve natural and beneficial floodplain values.
6. Reevaluate alternatives in light of any new information that may have become available.
7. Issue findings and a public explanation.
8. Implement the action.

Steps 1 and 3–6 have been undertaken as part of this EA. Steps 2 and 7 will be undertaken simultaneously with public comments on this EA.

3.3.2 Existing Conditions

Surface Water. The Tucson Basin is drained by the Santa Cruz River, which flows north and is approximately 4.5 miles west of the base. Major tributaries of the Santa Cruz River near DMAFB include the Rillito River that flows west into the Santa Cruz River and is 4.5 miles north of the base; Julian Wash, which originates southwest of the base and flows northwest briefly through DMAFB into the Santa Cruz River; and Pantano Wash, which flows northwest into the Rillito River and is 0.5 miles north of the northeastern boundary of the base.

There are no perennial drainages within the boundaries of DMAFB. The low level and irregularity of rainfall in the project area results in erratic flows in the local drainages. These drainages, like many in the desert southwest, are ephemeral and flow only during and immediately after storms, otherwise remaining dry. The dominant drainage system on the installation is Atterbury Wash, which flows northeast through DMAFB into Pantano Wash, which is approximately 1 mile northeast from where Atterbury Wash exits the base boundary. Kinneson Wash, which also drains storm water from the base, flows north through DMAFB into Pantano Wash, which is approximately 2.5 miles northeast from where Kinneson Wash exits the base boundary. These washes are shown in Figure 3-1.

The Ajo Way Detention Basin lies several miles to the west of DMAFB on a tributary to the Julian Wash. It was constructed by Pima County as a flood control basin, and is fed by storm water from the Tucson Diversion Channel and other storm water drainage channels.

Groundwater. Groundwater occurs in the unconsolidated alluvial deposits consisting of intertwining sand, gravel, silt, and clay. The saturated thickness of these sediments is extremely variable, thin (less than 200 feet) toward the mountains and thicker (greater than 5,000 feet) toward the center of the basin. In the vicinity of DMAFB, the Pantano Formation, Tinaja Beds, and Fort Lowell Formation are the primary sources of water. Most of the base wells draw water from the Tinaja Beds, with some contribution from the Fort Lowell Formation. Groundwater is the primary source of water in the Tucson area. Recharge is very slow. Studies on irrigated lands in central Arizona have estimated that downward flow rates in unsaturated materials are less than 10 feet per year. Vertical migration in unirrigated areas would take even longer (DMAFB 1998a).

DMAFB operates 11 wells that pump groundwater from the Tinaja Beds and the Fort Lowell Formation of the Tucson Basin aquifer. The base withdraws more water from the aquifer than is replaced each year through natural recharge.

Floodplains. According to FIRMs for DMAFB, flood hazards are undetermined for DMAFB, but they do indicate, via extrapolation, that the 100-year floodplains for three washes (the Julian Wash, Kinneson Wash, and Atterbury Wash) traverse DMAFB property. However, all of these washes cross the base property to the south or east of the project area and are not near the proposed project area.

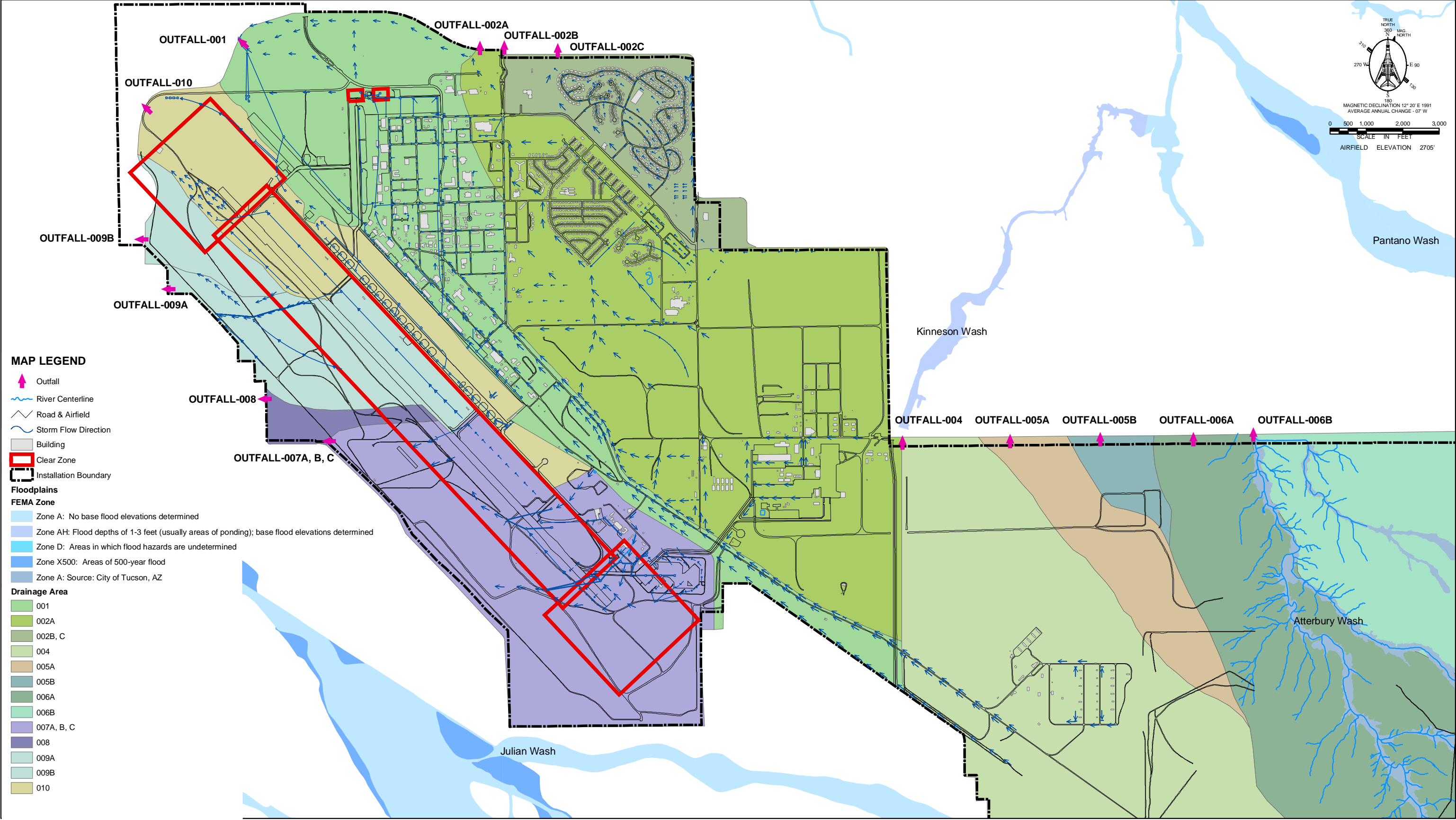


Figure 3-1. Storm Water Outfalls on Davis-Monthan AFB

A drainage study was completed for DMAFB by an outside contractor in 2001. The study used the City of Tucson peak discharge method to analyze various storm events. Figures from the study report show that a 100-year floodplain would occur in the area affected by the Proposed Action. A 100-year flood is predicted to accumulate in the unpaved area between the runway and Taxiway A (DMAFB 2001d). As shown in Figure 3-1, storm water draining from this area would flow in a northwest direction until it reached the nearest catch basin. The catch basins between the runway and Taxiway A provide entry to storm sewer pipes that channel the flow westward under the runway and out onto open ground. Any flooding caused in this area is likely man-made, due to the storm sewer system not being sized to handle a 100-year rain event.

3.4 Biological Resources

3.4.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats (i.e., wetlands, forests, and grasslands) in which they exist. Sensitive and protected biological resources include plant and animal species listed as threatened or endangered by the USFWS.

Under the ESA, an “endangered species” is defined as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined as any species likely to become an endangered species in the foreseeable future.

The USFWS recently presented an updated list of species considered as candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS has attempted to advise government agencies, industry, and the public that these species are at risk and might warrant protection under the ESA in the future.

3.4.2 Existing Conditions

The 355 CES/CEV has developed an Integrated Natural Resource Management Plan (INRMP) for DMAFB (DMAFB 1998b). The INRMP was developed to use as a tool in managing natural resources found on base. Much of the general information below was obtained from the DMAFB INRMP.

Vegetation. Tucson falls into the Arizona Upland Subdivision of the Sonoran Desert Scrub Biotic Community. This subdivision lies adjacent to and southeast of the Lower Colorado River Valley Subdivision. DMAFB exhibits influences of both subdivisions.

The vegetation of DMAFB contains elements of both subdivisions; more mesic drainage areas contain desert willow (*Chilopsis linearis*), mesquites (*Prosopis glandulosa* and *P. velutina*), catclaw (*Acacia gregii*), seepwillow (*Baccharis salicifolia*), blue palo verde (*C. floridum*), and foothill palo verde (*Cercidium microphyllum*). The drier upland areas contain creosote bush (*Larrea tridentate*), white bursage (*Ambrosia dumosa*), burrobrush (*Hymenoclea salsola*), saguaro (*Carnegiea gigantea*), fishhook barrel cactus (*Ferocactus wislizeni*), chainfruit cholla (*Cylindropuntia fulgida*), staghorn cholla (*C. versicolor*), blue palo verde, foothill palo verde, and other species. The principal species encountered in the Sonoran component of Semi-Desert Grassland include gramas (*Bouteloua rothrockii*, *B. californica*, *B. radicata*, *B. filiformis*, *B. parryi*, *B. barbata*), three-awns (*Aristida hamulosa*, *A. wrighti*, *A. ternipes*, *A. aristidoides*), false grama (*Cathastecum erectum*), ganglehead grass (*Heteropogon contortus*), and windmill grasses (*Chloris* spp.).

Approximately 40 percent of the vegetation at DMAFB consists of native vegetation. Most of the remaining DMAFB vegetative component is natural, but has lost most of its original aspect and composition due to grazing in the late 1800s and early 1900s. Originally, grasses in these areas were perennial bunch grasses that reproduced by seed. Grazing has altered the vegetative component of these grasslands, increasing the proportion of low-growing sod grasses or annuals depending on precipitation. In developed areas, the historic vegetative cover has been replaced with ornamental and horticultural species, turf, native species used in landscaping, and the built environment (i.e., buildings, roads, and runways).

Protected Plant Species Known to Occur on DMAFB

Saguaro Cactus. Both the giant saguaro (*Carnegiea gigantea*) and its less common form the crested saguaro (*C. gigantea* form *acristata*) are Arizona protected native plants, designated as highly safeguarded. The blooms of the saguaro are the state flower. This massive succulent grows in well-drained soils within the creosote bush scrub community type. This cactus grows throughout the Sonoran Desert, typically at elevations up to 3,500 feet above sea level. While the saguaro cactus is state listed as highly safeguarded, all cacti, including chollas, prickly pears, hedgehog cacti, and any other members of the plant family Cactaceae, have salvage-protected status in the state of Arizona. This status is also granted to the mesquites and palo verdes. Saguaro, various cholla, fishhook barrel cacti, prickly pear, and several hedgehog cactus species, as well as honey and velvet mesquite and blue palo verde, are found on DMAFB.

Protected Plant Species with Moderate Potential to Occur on DMAFB

Pima Pineapple Cactus. The pima pineapple cactus (*Coryphantha scheeri robustispina*) occurs in Pima County, but no representatives of the species were located during a 1990 survey at DMAFB. This cactus is protected under the ESA as endangered. The elevation range for the species is 2,300 feet to 5,000 feet above sea level. Its habitat is Sonoran Desert Scrub or Semi-Desert Grassland communities. It occurs in alluvial valleys or hillsides in rocky to sandy or silty soils.

Wetlands

A wetland inventory of DMAFB in 1996 identified no jurisdictional wetlands on the base.

Threatened and Endangered Species

The Arizona Game and Fish Department (AGF) is the main consulting agency for the protection of all wildlife species within the state of Arizona, including federally listed threatened and endangered species, as well as species not listed but of concern. The range of many animal species overlaps the DMAFB area and these species might be encountered on or near the base. Protected wildlife species known or likely to occur on DMAFB are described below. Special attention and precaution should be taken to protect them during and after construction.

- **Ferruginous Hawk.** Ferruginous hawks (*Buteo regalis*), formerly listed as Category 2 species by the USFWS, are no longer specifically protected by the ESA under new regulations. The species is listed by the AGF as threatened. Ferruginous hawks are uncommon to rare nesters in the grasslands of northern and west-central Arizona; they would only be expected as migrants or winter residents at DMAFB. Suitable feeding and roosting habitat consists of short grassland where prey is abundant. AMARC and areas north and west of the airfield provide habitat for a large population of squirrels and rodents, prey sources for this species. Aircraft parked in AMARC provide feeding and roosting perches for this and other raptors.
- **Loggerhead Shrike.** Loggerhead shrikes (*Lanius ludovicianus*) were previously classified as Category 2 by the USFWS; however, they are no longer protected by the ESA under new regulations. The species is not specifically listed by the AGF for protection, but is protected under other regulations. The species tends to nest and feed in small to mid-sized trees in open areas, and in open or brush areas with short to mid-level grasses. Such areas are present on the base. Potential habitat includes areas adjacent to

the west side of the airfield, part of the explosive ordnance disposal (EOD) area, AMARC, and north of the airfield along the edge of an old riparian corridor. Year-round and migratory loggerhead shrikes would be expected on DMAFB.

- ***Peregrine Falcon.*** The peregrine falcon (*Falco peregrinus anatum*) is classified by the USFWS as endangered and is an Arizona State Candidate species. It nests in cliffs and steep terrain near water or woodlands. Such habitat is not present at DMAFB, but is present in nearby mountains. Peregrine falcons feed primarily on birds and hunt mainly over grasslands, meadows, and open country. Suitable hunting terrain, such as open and grassy areas, is present in AMARC and in developed areas of the base. Those areas support prey such as rock doves (*Columba livia*).
- ***Southwestern Cave Myotis.*** The southwestern cave myotis (*Myotis velifer brevis*) is not specifically protected by the USFWS or the State of Arizona; it is considered sensitive by the U.S. Forest Service. This colonial species of bat is known to roost in caves, mines, and sometimes buildings. The species is known to occur within 2 miles of DMAFB and is considered likely to utilize the base as a forage site.
- ***Burrowing Owl.*** The burrowing owl (*Speotyto cunicularia*) is not specifically protected by the ESA or the AGF, but is protected under other Federal laws. DMAFB treats the burrowing owl as a species of concern. The state requires active burrows be avoided until the birds have left the nest. The species is a small brown owl; it prefers open plains, prairies, and fields and it nests in burrows in open ground. It is often seen by day standing on the ground or on fence posts. Burrowing owls usually have only one burrow, but some have multiple burrows. The species is found from Canada to Florida and as far south as the tip of South America. Northern populations migrate south during the winter.

The burrowing owl program is one of the more visible and active protected species programs at DMAFB. There are approximately 50 known burrows on the base. Under a Management Agreement, DMAFB contributes funds to a University of Arizona study of burrowing owls in the area, including those on the base. The study also uses State Heritage funds. Much of the study is focused on the banks of the Santa Cruz River. One aspect of the study is to determine the carrying capacity of the DMAFB ecosystem for this species. If efforts are successful, it is hoped the DMAFB population can be used as a reservoir for efforts to transplant individuals to new habitats off the base.

- **Swainson's Hawk.** Swainson's hawk (*Buteo swainsoni*) is not specifically protected by the ESA or AGF, but AGF considers it to be a species of concern. Habitat consists of prairies, rangeland, and brush areas. The species spends summers in western North America and winters in Argentina. Before 1997, one pair nested on the base; they were the only known pair within 150 miles. The pair raised two chicks. Both chicks and the adult male were banded; the adult female was not. In 1997, two Swainson's hawk nests were observed on DMAFB. One had three male chicks and the other had one male and one female chick. All five were banded. It could not be determined whether either adult male was the one observed at DMAFB before 1997. An AGF ornithologist is working with the base to develop and implement its raptor program. The intent is to maintain a steady-state population and to promote successful breeding by the species.
- **Cooper's Hawk.** Cooper's hawk (*Accipiter cooperii*) is not specifically protected by the ESA or the AGF; however, the AGF does treat it as a species of concern. Their habitat consists of woodlands, brush, and sometimes open country. The AGF is watching a pair sighted at DMAFB; the pair hatched two chicks during 1996, but they both died of trichomoniasis, which is carried by doves. Both adults have been banded.
- **Great Horned Owl.** Great horned owl (*Bubo virginianus*) is not specifically protected by the ESA or the AGF; however, the AGF treats it as a species of concern. Habitat for this species includes woodlands, canyons, streamsides, and deserts. There are many active nests on DMAFB. There are historic nests in AMARC, including an old nest in the eastern part of the base, which was not used during 1995. Other possible nests are on or near the firing range. The AGF has expressed interest in conducting future studies of the species on and near DMAFB.
- **Gila Monster.** The gila monster (*Heloderma suspectum*) is not specifically protected by the ESA or the AGF; however, they are a species of concern and protected under other Arizona laws. Infrequent sightings have been reported on DMAFB. Gila monsters inhabit shrubby, grassy, and succulent desert areas. They frequent the lower slopes of mountains and nearby plains. They tend to be found in canyon bottoms or arroyos with permanent or intermittent streams, where they burrow or seek shelter in mammal burrows, woodrat nests, and dense thickets; and under rocks. The species eats small mammals, eggs, reptiles, insects, and carrion.

Following is a list of protected and special-interest wildlife species that have a moderate likelihood to occur on DMAFB. Special attention and precaution should be taken to protect them during and after construction.

- **Desert Tortoise.** Desert tortoise (*Gopherus agassizii*) is not protected in Arizona under the ESA, although it is listed as endangered in Western Utah, Nevada, and California. The species is protected by the AGF as a candidate species. Tortoises often prefer rocky hillsides and outcrops for burrow sites. As DMAFB is predominantly flat, this habitat type is not found on the base. Tortoises do utilize the sides of desert washes as burrow sites, and Atterbury Wash provides potential burrow sites. The relatively greater plant productivity occurring in the wash increases the potential of encountering this species.

No desert tortoises have been sighted on the base, although they have been found within 2 miles. The populations in the Tucson Valley in general are not large; apparently larger populations are found closer to the Mogollon Rim. Since the animal is mobile, it is possible tortoises might migrate onto the base, especially as surrounding areas are cleared for development.

- **Coyote.** Coyotes (*Canis latrans*) are seen occasionally on the base, and periodically are found close to operations areas or living quarters. The animals are captured and then released to another location.
- **Badger.** Badgers (*Taxidea taxus*) are found occasionally on the base close to operations areas or living quarters. The animals are captured and then released to another location.
- **Bear.** There was an unsubstantiated bear (*Ursus* sp.) sighting at DMAFB by a control tower worker in 1996. Bears have been sighted in the Tucson Valley during hot, dry summer conditions in the mountains.
- **Spotted Skunk.** On at least one occasion the pest management crew has captured a spotted skunk (*Spilogale putorius*) and moved it to another location.
- **Javelina.** There are two known herds of javelina (*Tayassu (Pecari) tajacu*) on DMAFB, one in the vicinity of the air traffic control tower and one in the EOD area off Yuma Road.
- **Bobcat.** Bobcats (*Felis rufus*) have been spotted in the AMARC area.

Biological Resources in the Project Area

An area 500 feet on each side of the runway centerline and an area extending 3,000 feet beyond each end of the runway is currently cleared and maintained by frequent mowing. The 1,000-foot zone east of the runway centerline is currently a built environment with no natural vegetation. Therefore, the project area for purposes of analysis relative to biological resources is the outer approximately 500 feet of the western edge that would still require clearing to comply with the above regulations. This corresponds to a total area of approximately 296.99 acres and will be referred to as the project area.

A field survey of the project area was conducted on July 27–28, 2004. The project area was divided into nine survey areas using aerial photography (see Figure 2-3). The boundaries of each area were delineated based on roads and feasibility as potential management units and not on plant communities (habitats). The survey was conducted by walking circular transects providing 60 to 90 percent coverage of the project area depending upon area size and vegetation. As each of these areas was walked, ground truthing of the photo interpretation effort was accomplished by observing vegetation and land features. Dominant vegetation and any wildlife species that were observed during the ground-truth effort were recorded for each area. Results of this survey are summarized in Table 3-2.



Figure 3-2. Examples of Drainage To Be Filled and Vegetation To Be Removed

Table 3-2. Summary of Survey Results for Areas 1–9 Along the Flightline

Area	Dominant Vegetation Types and Other Observations
1	Area consists of widely-spaced creosote bush with gravel-sand-loam soils and little to no grass cover. Frequency of barrel cactus (<i>Ferocactus wislizeni</i>) is very low, occurring mostly on western slopes. Two pencil cholla (<i>Cylindropuntia arbuscula</i>) were observed near southern end of area. Desert broom (<i>Baccharis sarothroides</i>) and scattered mesquite and palo verde were observed in or near drainages and mesquite and palo verde were found in low-lying areas. The area is highly impacted by old diggings and dumps. Wildlife observed include roadrunners (<i>Geococcyx californianus</i>), western whiptail lizards (<i>Cnemidophorus tigris</i>), desert cottontails (<i>Sylvilagus audubonii</i>), and black-tailed jackrabbits (<i>Lepus californicus</i>). Dens, apparently no longer used, were also observed near the south end of site.
2	Area transitions from creosote bush dominant matrix in the southern portion to more cactus/greasewood in northern end. Previous disturbance has killed most of the cholla (<i>Cylindropuntia fulgida</i> and <i>C. versicolor</i>) and barrel cacti in the southern end. Some barrel cacti in the middle and northern portions are approaching 5 feet in height. Desert broom and scattered mesquite and palo verde were observed in or near drainages and mesquite and palo verde were found in low-lying areas. Tadpoles were observed in a pool at the drainage outfall. Mourning doves (<i>Zenaida macroura</i>) were found crowded under larger mesquites along the runway edge of this site during the middle of the day.
3	Area consists of a mixture of creosote bush and cacti, with creosote bush slightly dominating but cactus (particularly cholla) increasing to the southern end of the area. <i>Baccharis</i> and trees were observed in drainages and trees occur randomly and in patches throughout the area.
4	Area consists of a mixture of cactus (particularly cholla) and creosote bush. Large amounts of prickly pear and barrel cacti (approximately 65 to 70 barrel cacti) also occur in this area. Scattered old dumps (scrap iron and domestic) and building foundations were observed. A female Swainson's hawk (<i>Buteo swainsoni</i>) was observed in this area as well as Gambel's quail (<i>Callipepla gambelii</i>) near the southern end.
5	Area consists of a mixture of cacti and trees, with cholla being the most frequently encountered cactus.
5A	Area also includes the edges of the northern and southern roads to the existing helipad. This area is cactus-dominated with <i>Baccharis</i> and trees found in drainages and other trees occurring randomly and in patches throughout the area. A band of heavy creosote bush was observed along the northern edge of the area. Other infrequent plants observed include <i>Yucca</i> sp. and melon-loco (<i>Apodanthera undulate</i>). Roadrunners were observed in the area.
6	This area is dominated by cactus.
7	This area consists of a cactus/creosote bush mix.
8	The northwestern and central portion of this area is dominated by cacti. The <i>Opuntia</i> coverage is dense enough to obscure hedgehog cacti (<i>Echinocereus coccineus</i> , <i>E. fasciculatus</i> , and <i>E. stramineus</i>) and smaller barrel cacti. The southwestern corner of this area transitions to creosote bush dominance. The low-lying area in the east-central portion supports a substantial stand of <i>Baccharis</i> with interspersed mesquite and palo verde. Numerous Gambel's quail, black-tailed jackrabbits, whiptail lizards, desert cottontails, tracks of javelinas (<i>Tayassu (Pecari) tajacu</i>), and a Swainson's hawk nest were observed.
9	Area consists of a cactus-dominated matrix in the southeast corner. A <i>Baccharis</i> /tree-dominated band occurs along a drainage angling through the central portion (mostly mesquite overstory). A cactus/creosote-dominated matrix occurs in the northwestern portion of the area with scattered mesquite and palo verde. Extensive evidence of sheet erosion was observed in the southeastern and south-central portions. Numerous Gambel's quail were also observed.

No Federal threatened, endangered, or candidate species were observed in the project area during the surveys. No state-listed wildlife species were observed. A female Swainson's hawk was observed and heard over the southern end of the project area and appeared to have a nest in this area. Swainson's hawks, while not protected by the AGF, are a species of interest and active management and research programs on this species are ongoing at DMAFB. Numerous mourning doves, roadrunners, Gambel's quail, western whiptail lizards, black-tailed jackrabbits, desert cottontails, and javelina tracks were observed in the project area.

State-protected plant species were very abundant on the site. Examples of vegetation type and densities can be found in Figure 3-2. No saguaro cacti were observed in the project area during the survey, and none are known to exist there from previous surveys (Lisa 2004). Jumping cholla, Engelmann's prickly pear, and fishhook barrel cactus were very common, increasing in density toward the southern end of the project area. Also found toward the southern end of the project area were several species of hedgehog cacti. Mesquite and palo verde were common in drainages and other mesic areas. All of these species are salvage-protected by the Arizona Department of Agriculture (ADA). This status requires that a Notice of Intent to Clear Land be filed with and approved by the ADA in a prescribed period of time (60 days for the acreage potentially impacted by this project) before any salvage or clearing activities commence on the site. Filing of the Notice of Intent to Clear Land allows the ADA to advertise that protected species might be available for salvage, facilitating the salvage process for the project area.

3.5 Hazardous Materials and Wastes Management

3.5.1 Definition of Resource

Hazardous material is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the Toxic Substances Control Act (TSCA), as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, a serious irreversible illness, incapacitating reversible illness, or pose a substantial threat to human health or the environment. Hazardous waste is defined by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste Amendments (HSWA), as any solid, liquid, contained gaseous, or semisolid waste; or any combination of wastes that poses a substantial present or potential hazard to human health or the environment.

Evaluation of hazardous materials and wastes focuses on underground storage tanks and aboveground storage tanks and the storage, transport, and use of pesticides and herbicides, fuels, and Petroleum, Oil, and Lubricants (POL). Evaluation can also extend to generation, storage, transportation, and disposal of hazardous wastes when such activity occurs at or near the project site of a proposed action. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well-being of wildlife species, botanical habitats, soil systems, and water resources. In the event of release of hazardous materials or wastes, the extent of contamination varies based on the type of soil, topography, and water resources.

Special hazards are those substances that might pose a risk to human health but are not regulated as contaminants under the hazardous waste statutes. Hazards of significance associated with the Proposed Action are asbestos and lead-based paint. The presence of special hazards or controls over them might affect, or be affected by, a proposed action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of a proposed action.

To protect habitats and people from inadvertent and potentially harmful releases of hazardous substances, the U.S Department of Defense (DOD) has dictated that all facilities develop and implement Hazardous Material Emergency Planning and Response Plans or Spill Prevention, Control, and Countermeasure Plans. Also, DOD has developed the Environmental Restoration Program (ERP), intended to facilitate thorough investigation and cleanup of contaminated sites on military installations. These plans and programs, in addition to established legislation (i.e., CERCLA and RCRA) effectively form the “safety net” intended to protect the ecosystems on which most living organisms depend.

AFPD 32-70, *Environmental Quality*, establishes the policy that the USAF is committed to the following environmentally sound practices:

- Cleaning up environmental damage resulting from its past activities.
- Meeting all environmental standards applicable to its present operations.
- Planning its future activities to minimize environmental impacts.
- Managing responsibly the irreplaceable natural and cultural resources it holds in public trust.
- Eliminating pollution from its activities wherever possible.

AFPD 32-70 and the AFI 32-7000 series incorporate the requirements of all Federal regulations, other AFIs, and DOD Directives for the management of hazardous materials, hazardous wastes, and special hazards.

3.5.2 Existing Conditions

355 CES/CEV is responsible for the hazardous material and waste plans for the installation. In conformance with the policies established by AFPD 32-70, 355 CES/CEV has developed plans to manage hazardous materials, hazardous wastes, and special hazards on the base.

Hazardous Materials. AFI 32-7086, *Hazardous Materials Management*, establishes procedures and standards that govern management of hazardous materials throughout the USAF. It applies to all USAF personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities. 355 WG manages hazardous materials in accordance with AFI 32-7086.

Hazardous Wastes. 355 WG maintains a *Hazardous Waste Management Plan* (DMAFB 2001b) as directed by AFI 32-7042, *Solid and Hazardous Waste Compliance*. The *Hazardous Waste Management Plan* provides guidance to DMAFB personnel on handling, storage, and disposal of hazardous materials and implements the USEPA “cradle-to-grave” management control of hazardous waste. Wastes generated at DMAFB include solvents, oils, contaminated fuel, paint chips, waste paint, strippers, grease removed from equipment, and spill pads.

Hazardous waste management activities at DMAFB are performed by contractors supervised by 355 CES/CEV. Base and contractor personnel collect hazardous wastes at satellite accumulation points (SAPs). From the SAPs, wastes are taken to the Centralized Accumulation Point (CAP) on the base and shipped to permitted off-base disposal facilities. In accordance with the DMAFB Hazardous Waste Management Program, hazardous wastes are stored on base for a maximum of 90 days. All hazardous wastes stored longer than 90-days are stored at the Defense Reutilization and Marketing Office (DRMO).

Asbestos. AFI 32-1052, *Facilities Asbestos Management*, provides direction for asbestos management at USAF installations. AFI 32-1052 requires installations to develop an asbestos management plan for the purpose of maintaining a permanent record of the status and condition of asbestos-containing material (ACM) in installation facilities, as well as documenting asbestos management efforts. In addition, the instruction requires installations to develop an asbestos

operating plan detailing how the installation accomplishes asbestos-related projects. Asbestos is regulated by USEPA with the authority promulgated under the Occupational Safety and Health Act (OSHA). Section 112 of the CAA regulates emissions of asbestos fibers to ambient air. USEPA policy is to leave asbestos in place if disturbance or removal could pose a health threat.

355 WG fulfills the requirements of AFI 32-1052 with the *Asbestos Management Plan*. This plan specifies procedures for the removal, encapsulation, enclosure, and repair activities associated with ACM-abatement projects. The objective of the plan is to reduce the potential of personnel exposure to potentially hazardous levels of airborne asbestos fibers and assist in maintaining compliance with all Federal, state, and local asbestos regulations. A survey was performed at buildings at DMAFB to locate, identify, and evaluate any materials containing asbestos. Materials that might contain asbestos include thermal-system insulation and floor tiles. Asbestos materials are removed on an as-needed basis to minimize health risks from release of asbestos fibers during normal activities, maintenance, renovation, or demolition.

Lead-Based Paint. The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X), passed by Congress on October 28, 1992, regulates the use and disposal of lead-based paint on Federal facilities. Federal agencies are required to comply with applicable Federal, state, and local laws and regulations relating to lead-based paint activities and hazards.

USAF policy and guidance establishes lead-based paint management at USAF facilities (USAF 1993). Additionally, the policy requires each installation to develop and implement a facility management plan for identifying, evaluating, managing, and abating lead-based paint hazards. DMAFB has conducted a survey of buildings for the presence of lead-based paint. The survey mainly included child-occupied facilities. The results of the survey are maintained in a lead-based paint database at DMAFB. The *Lead Based Paint Management Plan* provides an understandable and easy-to-follow approach to lead-based paint management. It covers designation of duties, identification of hazards, testing procedures, abatement methods, training requirements, and protection of families and workers.

Pollution Prevention. AFI 32-7080, *Pollution Prevention Program*, implements the regulatory mandates in the Emergency Planning and Community Right-to-Know Act; Pollution Prevention Act of 1990; EO 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*; EO 12873, *Federal Acquisition, Recycling, and Waste Prevention*; and EO 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. AFI 32-7080 prescribes the

establishment of Pollution Prevention Management Plans. The 355 WG fulfills this requirement with the *Pollution Prevention Management Action Plan*. This plan ensures that DMAFB maintains a waste-reduction program and meets the requirements of the CWA; the National Pollution Discharge Elimination System (NPDES) permit program; and Federal, state, and local laws and regulations for spill prevention, control, and countermeasures.

Environmental Restoration Program. The ERP at DMAFB began in January 1982 with a basewide records search that identified 34 ERP sites for further investigation. Supplemental site assessments and investigations in the later 1980s and early 1990s have brought the total number of sites to 49. Forty-six sites are currently closed under No Further Action, one is under investigation, and eight are under remediation (DMAFB 2003b). These ERP sites include landfills, flush farm, fire training area, fuel pumphouse, and a dross pile. The primary contaminants in soil and water include fuels, waste oil, waste solvents, paints, garbage, and dross. Currently, DMAFB is not on the National Priorities List (NPL).

There are six ERP sites in the project area. These are LF-01, Main Base Landfill; DP-10, Chemical Burial Site; OT-27, Fuel Tank Sludge Burial Site; ST-35, Fuel Pumphouse; ST-38, Hot Refueling Area; and OT-39, Dross Piles (Sawtooth Salvage). LF-01, ST-35, and DP-10 are currently open. OT-27, ST-38, and OT-39 are closed or will receive no further action.

3.6 Infrastructure

3.6.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban, or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to economic growth of an area. The infrastructure information provided was obtained from the *The General Plan Davis-Monthan Air Force Base Tucson, Arizona* (DMAFB 2000) and provides a brief overview of each infrastructure component and comments on its existing general condition. The infrastructure components to be discussed in this section are transportation systems, utilities (electrical power, natural gas, and water supply), solid waste, and sanitary systems.

Solid waste management primarily concerns itself with the availability of landfills to support a population's residential, commercial, and industrial needs. Alternative means of waste disposal might involve waste-to-energy programs or incineration. In some localities, landfills are designed specifically for, and limited to, disposal of construction and demolition debris. Recycling programs for various waste categories (e.g., glass, metals, and papers) reduce reliance on landfills for disposal.

3.6.2 Existing Conditions

Airfield. The airfield consists of approximately 1,453 acres, including 402 acres of paved surface. The 13,645-foot-long runway is 200 feet wide and oriented in a 12/30 direction. The first 2,700 feet of Runway 12 and the first 2,224 feet of Runway 30 are concrete. The middle 8,500 feet of Runway 12/30 are porous friction surface asphalt. There are 1,000-foot overruns at each end of the runway, which are served by three arresting barriers.

There are live load arm/disarm areas on Taxiways A and A1, at the north end of the runway, and an alternate live load arm/disarm area at Taxiway A4 on the south end of the runway. Taxiway E is peculiar to operations at DMAFB in that it extends 8,564 feet from the south end of the runway, across Yuma Street and into the AMARC ramp area that is used to prepare aircraft for storage or parts reclamation. When aircraft are moved across Yuma Street, it must be closed and wing walkers must be used to guide the aircraft.

There is more than sufficient parking ramp space available at DMAFB. The 162 Flight Wing, "Operation Snowbird" transient aircraft use the north ramp area. The west ramp contains parking for the MH-60 of the 305 Rescue Squadron, U.S. Customs, and fighter aircraft. The operational ramp has sufficient ramp space to accommodate up to 120 fighter or A-10 type aircraft, a large marshaling area, and space for several transient transport aircraft near Base Operations. The alert ramp can accommodate five fighter aircraft, and the adjacent Victor ramp provides parking for four C-130s. The Whiskey ramp has improved parking for ten C-130 transport aircraft with additional interim parking for five more.

Transportation. Interstate 10, just west of DMAFB, is the major highway serving Tucson. Interstate 19 is the major highway between Tucson and the Mexican border. Golf Links Road is the major street, which runs east-west along the northern base boundary. It crosses Craycroft Road that serves as the Main Gate entry street to the base, and Sunglow Road which serves the Swan Gate access. Wilmot Road runs north-south and serves the Wilmot Gate and off-base

access to AMARC. Kolb Road crosses the base north to south; the only location at which it affords access to the base is at Irvington Gate.

Storm Water. Storm runoff is drained by surface flow, ditches, and underground pipes. Generally, the runoff travels towards the northwest because the base's topography slopes downward in a northwest direction. There are two retention ponds on base, one on the edge of the AMARC area just due south of the golf course and the other at the northern end of the airfield runway.

The Proposed Action project area is drained by storm water Outfalls 007A, B, and C; Outfall 008; Outfalls 009A and B; and Outfall 010, as shown in Figure 3-1. Drainage Area 007 includes the southern portion of the runway and the land surrounding it. Runoff from this drainage area is discharged under the fence bordering the base in three locations (Outfalls 007A, 007B, and 007C). Drainage Area 008 drains a small area north of Drainage Area 007. The shallow ditch from Outfall 007 re-enters the base after flowing through an off-base area for approximately 500 feet. The ditch then flows through the base and exits base property as Outfall 008, near the off-base intersection of Irvington Road and Swan Road. Storm water in this drainage area flows through a sandy swale, across a dirt roadway, and then into the ditch, which flows off-base.

Drainage Area 009 drains the middle segment of the runway and the land surrounding it. The terrain found in this area is relatively flat. Outfall 009A is approximately 5 feet wide and is surrounded by shrubs and weeds; it previously drained all of Drainage Area 009. An earthen berm was constructed at the inner facility fenceline when the base fitness trail was constructed. This berm prevents water from exiting the base at Outfall 009A and thus conveys water northwest along the berm to a new outfall, Outfall 009B. Outfall 009B in the northwest corner of the base is a ditch that was formed by flowing storm water, and is approximately 2 feet wide. The ditch conveys water under the fenceline and off DMAFB property.

Drainage Area 010 drains the northwestern portion of the runway and associated taxiways. This area is relatively flat with a gentle northwesterly descending slope. Storm water flows northwest to Outfall 010 via surface drainage channels that discharge under the perimeter road, across the new fitness track, and into three approximately 5-foot-wide rectangular reinforced concrete culverts. The culverts carry storm water beneath Golf Links Road off base.

Storm water from these outfalls eventually drains to the Ajo Way Detention Basin, which is several miles west of DMAFB on Ajo Way.

The storm drainage system is generally adequate for the arid climate. However, the rainy season has particularly heavy thunderstorms from July through September, which cause occasional inundation for some areas of the base. Excessive flows of storm water runoff have degraded some of the security grates at the outfall locations where the flows exit the base. During heavy storms, the bars of these grates are bent by the force of the water exiting the base.

Liquid Fuel System. The base receives, stores, and distributes a variety of fuels including JP-8 aviation fuel, DL-2 diesel fuel, Mogas unleaded regular, and two kinds of cryogenics fuel: liquid oxygen and liquid nitrogen. The flightline uses four locations as hot refueling pits; two of these are serviced by Pumphouse J-4, and two are serviced by Pumphouse J-3. Pumphouses J-1 and J-2 are not currently active. These four pumphouses are connected by an underground pipeline. In addition, on the West Ramp, Pumphouse A-2 can dispense fuel; however, it is resupplied by tanker truck. On the West Ramp, Pumphouse A-1 is inactive.

Solid Waste. Wastes disposed of in the solid waste stream at DMAFB are expected to consist only of those materials that cannot be effectively recycled. This commonly includes paper towels and other sanitary wastes, food-soiled wrappings and packagings, most food wastes, plastic bags and wrappings, nonrecyclable construction and demolition (C&D) wastes, and other miscellaneous nonrecyclable materials from administrative, industrial, food-service, and retail operations.

C&D waste and nonrecurring municipal solid waste (MSW) generated under contract are the responsibility of the contractor. C&D waste and nonrecurring MSW generated under contract or by base personnel are recycled to the greatest extent possible. Contractors are required to report the quantities of recycled C&D waste. Specifications in these contracts require contractors to provide information regarding the disposition of the waste they generate.

There are no active landfills on DMAFB. MSW is disposed at the Los Reales Landfill, a licensed and secure landfill operated by the City of Tucson. Disposal of C&D debris generated during contracted facility demolition, renovations, and new construction activities is the responsibility of the contractor performing the work. Contract documents require disposal in a permitted construction debris landfill. Debris from in-house construction is placed in 30- or 40-cubic-yard roll-off bins and disposed in the Speedway Landfill (operated by the City of Tucson). The Speedway Landfill only accepts inert materials (DMAFB 2000).

3.7 Safety

3.7.1 Definition of Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses workers' health and safety during C&D activities and facilities construction and public safety during C&D activities and during subsequent operations of those facilities.

Construction worksite safety requires adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by numerous DOD and USAF regulations designed to comply with standards issued by OSHA and USEPA. These standards specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors.

3.7.2 Existing Conditions

All contractors performing construction activities at DMAFB are responsible for following ground safety regulations and worker compensation programs and are required to conduct construction activities in a manner that does not pose any risk to its workers or base personnel. An industrial hygiene program addresses exposure to hazardous materials, use of personal protective equipment, and availability of Material Safety Data Sheets. Industrial hygiene is the responsibility of contractors, as applicable.

Contractor responsibilities are to review potentially hazardous workplace operations; to monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous material), physical (e.g., noise propagation), and biological (e.g., infectious waste) agents; to recommend and evaluate controls (e.g., ventilation, respirators) to ensure personnel are properly protected or unexposed; and to ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures.

DMAFB has several activities which require extensive Quantity-Distance (QD) safety zones. These zones are established to minimize risk and exposure to individuals from explosives and explosive storage facilities. No inhabited facilities are allowed within QDs. QDs at DMAFB

include Munitions Storage Area (MSA), EOD area, arm and disarm aprons on the airfield, small arm training ranges, AMARC EOD area, AMARC missile dismantling pad, and AMARC ammunition shipping/inspection/storage facilities (DMAFB 2000).

DMAFB is currently conducting a range inventory report (DMAFB 2001c). As part of this report, DMAFB identified four closed-range sites (see Figure 3-3). These range sites contain various munitions, unexploded ordnance (UXO), and Chemical Agent Identification Sets (CAIS). Training Areas 1 and 2 are the project area. Training Area 1 is west of the runway and Training Area 2 is at the southern end of the runway. These training areas were historically used in connection with helicopter training exercises involving military munitions. Most of the munitions, UXO, and CAIS on the surface of DMAFB have been removed. However, munitions, UXO, and CAIS still can be found below the ground surface.

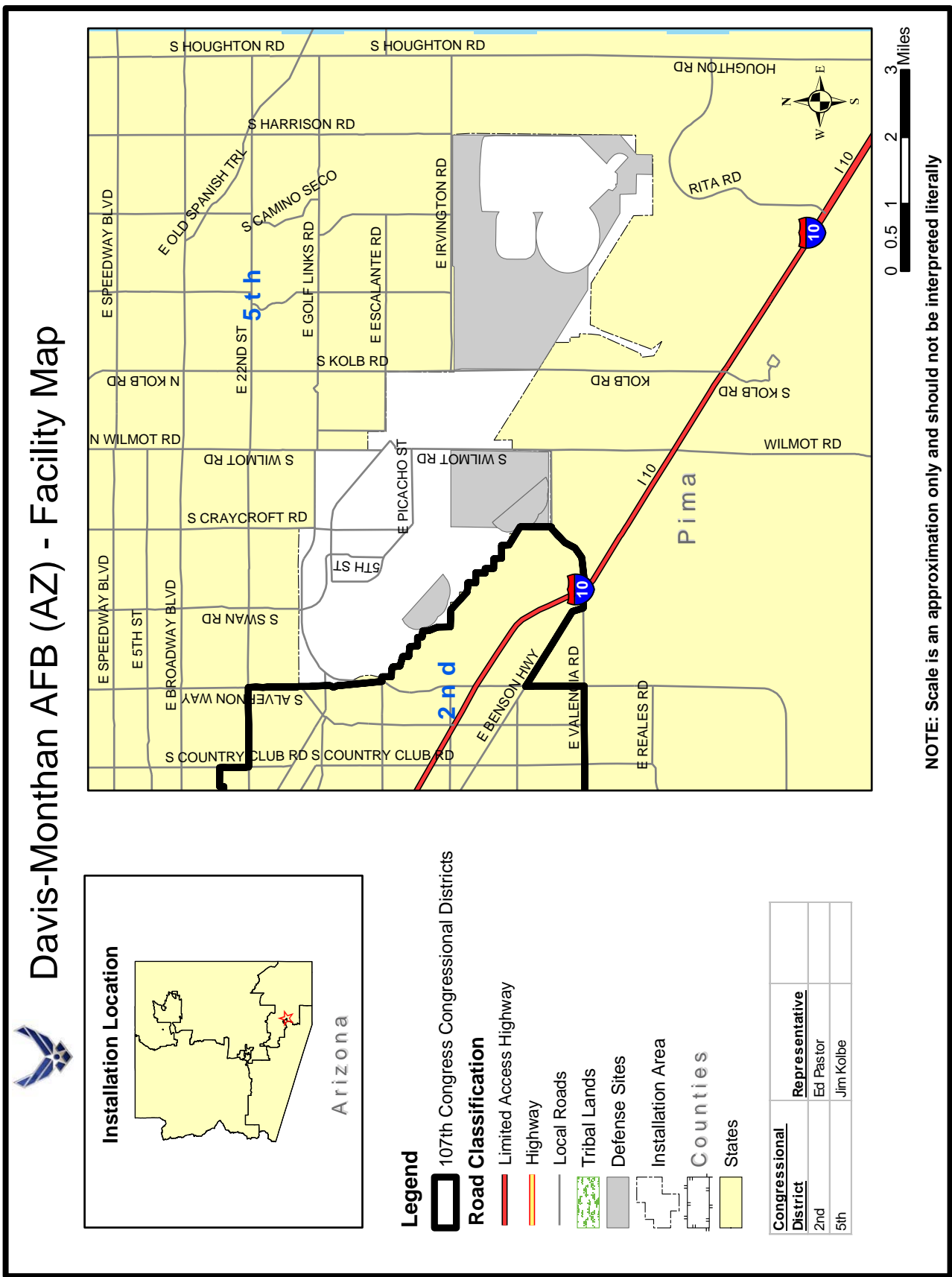


Figure 3-3. Official Ranges on Davis-Monthan AFB

4. Environmental Consequences

This section of the EA assesses potential environmental consequences associated with the Proposed Action. The EA analysis includes direct, indirect, and cumulative impacts. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable. Cumulative impacts are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The cumulative impact analysis is provided in Section 5 of this EA. Environmental consequences are addressed in the context of the scope of the Proposed Action and alternatives as described in Section 2.0 and in consideration of the potentially affected environment as characterized in Section 3.0.

4.1 Air Quality

4.1.1 Evaluation Criteria

The environmental consequences to local and regional air quality conditions near a proposed Federal action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, the impact in NAAQS “attainment” areas would be considered significant if the net increases in pollutant emissions from the Federal action would result in any one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations
- Represent an increase of 10 percent or more in an affected AQCR emissions inventory
- Exceed any evaluation criteria established by a SIP

The area including DMBFB is a maintenance area for CO and is in attainment for all other criteria pollutants. However, Pima County is an area of concern for PM₁₀ emissions. Impacts on air quality in NAAQS “nonattainment” areas are considered significant if the net changes in project-related pollutant emissions result in any of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Increase the frequency or severity of a violation of any ambient air quality standard
- Delay the attainment of any standard or other milestone contained in the SIP

With respect to the General Conformity Rule, impacts on air quality would be considered significant if the proposed Federal action would result in an increase of a nonattainment or maintenance area's emissions inventory by 10 percent or more for one or more nonattainment pollutants, or if such emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or for pollutants for which the area has been redesignated as a maintenance area.

The *de minimis* threshold emissions rates were established by USEPA in the General Conformity Rule in order to focus analysis requirements on those Federal actions with the potential to have "significant" air quality impacts. Table 4-1 presents these thresholds, by regulated pollutant. These *de minimis* thresholds are similar, in most cases, to the definitions for major stationary sources of criteria and precursors to criteria pollutants under the CAA's New Source Review (NSR) Program (CAA Title I). Only the CO *de minimis* threshold had regulatory relevance to the Proposed Action. However, the other *de minimis* thresholds are presented here as a useful frame of reference. As shown in Table 4-1, *de minimis* thresholds vary depending upon the severity of the nonattainment area classification.

4.1.2 Proposed Action

The Proposed Action have short-term, direct impacts on air quality; no long-term air quality impacts are expected. Regulated pollutant emissions from the Proposed Action would not contribute to or affect local or regional attainment status with NAAQS. The Proposed Action would generate air pollutant emissions as a result of grading, filling, compacting, and paving operations, but these emissions would be temporary and would not be expected to have any off-site impacts.

The Proposed Action would not cause or contribute to violation of any ambient air quality standard. Construction activities would generate total suspended particulate (TSP) and PM₁₀ emissions as fugitive dust from ground-disturbing activities (e.g., grading, demolition, soil piles, unpaved roads) and combustion of fuels in construction equipment. Fugitive dust emissions

Table 4-1. Conformity *de minimis* Emission Thresholds

Pollutant	Status	Classification	<i>de minimis</i> Limit (tpy)
Ozone (measured as Nitrogen Oxides (NO _x) or Volatile Organic Compounds (VOCs))	Nonattainment	Extreme	10
		Severe	25
		Serious	50
		Moderate/marginal (inside ozone transport region)	50 (VOCs)/100 (NO _x)
		All others	100
	Maintenance	Inside ozone transport region	50 (VOCs)/100 (NO _x)
		Outside ozone transport region	100
Carbon Monoxide (CO)	Nonattainment/ maintenance	All	100
Particulate Matter (PM ₁₀)	Nonattainment/ maintenance	Serious	70
		Moderate	100
		Not Applicable	100
Sulfur Dioxide (SO ₂)	Nonattainment/ maintenance	Not Applicable	100
Nitrogen Oxides (NO _x)	Nonattainment/ maintenance	Not Applicable	100

Source: 40 CFR 93.153

would be greatest during the initial site preparation activities and would vary from day to day depending on the construction phase, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of construction activity.

During construction, emissions from the Proposed Action would produce slightly elevated short-term PM₁₀ ambient air concentrations. However, the effects would be temporary and would fall off rapidly with distance from the proposed construction site.

Conformity. Since the Proposed Action is in a maintenance area for CO, General Conformity Rule requirements are applicable. As shown in Table 4-2, the Alternative A would generate CO emissions well below conformity *de minimis* limits as specified in 40 CFR 93.153. Because the emissions generated would be below *de minimis* levels, it is reasonable to assume that the Proposed Action would not cause a violation of the NAAQS and a full Conformity Determination would not be required.

Even though Pima County is in attainment for PM₁₀ emissions, this pollutant is of special concern to state and local agencies. Therefore, it was assumed that vegetation proposed for removal would be conducted over a 2-year period. In addition, the project area would be watered a minimum of three times per day to reduce these emissions by 68 percent. As a result, the Proposed Action would emit only 65.64 and 58.09 tons of PM₁₀ per year for CY 2005 and 2006, respectively. Therefore, no significant direct or indirect effects on regional or local air quality would result from implementation of the Proposed Action. Emissions factors, calculations, and estimates of construction-related emissions for the Proposed Action are detailed in Appendix C.

Table 4-2. Annual Air Quality Emissions from the Proposed Construction

CY	NO _x (tpy)	VOC (tpy)	CO (tpy) ^a	SO ₂ (tpy)	PM ₁₀ (tpy)
2005	45.62	10.49	20.40	2.76	211.62 ^b 65.64 ^c
2006	27.32	4.27	5.91	1.82	186.32 ^b 58.09 ^c
2009	3.45	0.54	0.75	0.23	24.90 ^b 7.77 ^c

Note:

^a Denotes nonattainment pollutant in Pima County.

^b Emissions if no best management practices were implemented.

^c Assumes removing vegetation from project area over a 2-year period and watering three times per day.
tpy tons per year

Other Analyses: NAAQS and Prevention of Significant Deterioration (PSD) Standards.

Through comparison with similar projects, best engineering judgment indicates that the Proposed Action would have a negligible effect on the ambient air quality in Pima County. There are no PSD Class I areas within 10 kilometers (6.2 miles) of the Proposed Action. Therefore, no impacts on Class I areas are expected.

Environmental Protection Measures

All Pima County Dust Control Methods should be followed during and after construction. Important environmental protection measures are listed below.

- An Air Quality Activity Permit must be obtained from PDEQ prior to commencing earthmoving, trenching, or road construction.
- Application of water by means of trucks, hoses, and/or sprinklers at sufficient frequency and quantity prior to conducting, during, and after earthmoving operation.

- Grade each phase separately and time to coincide with construction phase. Grade entire project but apply chemical stabilizers or ground cover to graded areas where construction is scheduled to begin more than 60 days after grading is complete.
- Three- to five-foot-tall wind fencing should be used that has 50 percent or less porosity, is adjacent to roadways and used in conjunction with watering or chemical stabilizers. Chemical stabilizers should be applied per manufacturer's recommendations.
- Empty loaders slowly and keep bucket close to trucks while dumping.
- Do not overload haul trucks. The freeboard should be no less than 3 inches.
- All work activities should be stopped during periods of high winds.
- Establish vegetation as quickly as possible when active operations have ceased.
- Eliminate unnecessary travel by restricting access or redirecting traffic to reduce traffic trips.

4.1.3 Alternative A

Alternative A would have similar impacts as the Proposed Action. However, less vegetation would be removed from the project area.

Conformity. Because Alternative A represents less vegetation removal and associated soil disturbance, emissions are proportionately less. Particulate emissions would be approximately 35 percent lower than the Proposed Action in CY 2005 and approximately 40 percent lower in CY 2006. Emissions would be the same as the Proposed Action in CY 2009.

As shown in Table 4-3, Alternative A would generate CO emissions well below conformity *de minimis* limits as specified in 40 CFR 93.153. Because the emissions generated would be below *de minimis* levels, it is reasonable to assume that the Proposed Action would not cause a violation of the NAAQS and a full Conformity Determination would not be required.

Even though Pima County is in attainment for PM₁₀ emissions, this pollutant is of special concern to state and local agencies. Therefore, it was assumed that vegetation proposed for removal would be conducted over a 2-year period. In addition, the project area would be watered a minimum of three times per day to reduce these emissions by 68 percent. As a result, Alternative A would emit only 42.6 and 35.1 tons of PM₁₀ per year for CY 2005 and 2006, respectively. Therefore, no significant direct or indirect effects on regional or local air quality would result

from implementation of the Proposed Action. Emissions factors, calculations, and estimates of construction-related emissions for Alternative A are detailed in Appendix C.

Table 4-3. Annual Air Quality Emissions from Alternative A Proposed Construction

CY	NO _x (tpy)	VOC (tpy)	CO (tpy) ^a	SO ₂ (tpy)	PM ₁₀ (tpy)
2005	34.60	8.77	18.02	2.03	137.71 ^b 42.61 ^c
2006	16.30	2.55	3.53	1.08	112.41 ^b 35.06 ^c
2009	3.45	0.54	0.75	0.23	24.90 ^b 7.77 ^c

Note:

^a Denotes nonattainment pollutant in Pima County.

^b Emissions if no best management practices were implemented.

^c Assumes removing vegetation from project area over a 2-year period and watering three times per day.

tpy tons per year

Environmental Protection Measures

Alternative A would follow the same environmental protection measures mentioned above for the Proposed Action.

4.1.4 Alternative B

Alternative B would have similar impacts as Alternative A. However, perimeter/Columbia Drive and the hill terrain feature would not be demolished and brought down to grade.

Conformity. Because Alternative B represents less soil disturbance, emissions are proportionately less. Particulate emissions would be 42 percent lower than the Proposed Action in CY 2005 and approximately 40 percent lower in CY 2006. No emissions would occur in CY 2009 because the hill terrain feature would not be brought down to grade.

As shown in Table 4-4, Alternative B would generate CO emissions well below conformity *de minimis* limits as specified in 40 CFR 93.153. Because the emissions generated would be below *de minimis* levels, it is reasonable to assume that the Proposed Action would not cause a violation of the NAAQS and a full Conformity Determination would not be required.

Even though Pima County is in attainment for PM₁₀ emissions, this pollutant is of special concern to state and local agencies. Therefore, it was assumed that vegetation proposed for removal would be conducted over a 2-year period. In addition, the project area would be watered a minimum of three times per day to reduce these emissions by 68 percent. As a result, Alternative

B would emit only 37.94 and 35.06 tons of PM₁₀ per year for CY 2005 and 2006, respectively. Therefore, no significant direct or indirect effects on regional or local air quality would result from implementation of the Proposed Action. Emissions factors, calculations, and estimates of construction-related emissions for Alternative B are detailed in Appendix C.

Table 4-4. Annual Air Quality Emissions from Alternative B Proposed Construction

CY	NO _x (tpy)	VOC (tpy)	CO (tpy) ^a	SO ₂ (tpy)	PM ₁₀ (tpy)
2005	32.37	8.05	17.53	1.88	122.74 ^b 37.94 ^c
2006	16.30	2.55	3.53	1.08	112.41 ^b 35.06 ^c
2009	0.00	0.00	0.00	0.00	0.00

Note:

^a Denotes nonattainment pollutant in Pima County.

^b Emissions if no best management practices were implemented.

^c Assumes removing vegetation from project area over a 2-year period and watering three times per day.

tpy tons per year

Environmental Protection Measures

Alternative B would follow the same environmental protection measures mentioned above for the Proposed Action.

4.1.5 No Action Alternative

Under the No Action Alternative, there would be no change in or effects on air quality within Pima County.

4.2 Geological Resources

4.2.1 Evaluation Criteria

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating environmental consequences of a proposed action on geological resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering design are incorporated into project development.

Analysis of environmental consequences on geological resources typically includes the following evaluation tools:

- Identification and description of resources that could potentially be affected.
- Examination of a proposed action and the potential effects this action might have on the resource.
- Assessment of the significance of environmental consequences.
- Provision of mitigation measures in the event that potentially significant impacts are identified.

Effects on geology and soils would be adverse if they would alter the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure, or function within the environment.

4.2.2 Proposed Action

Under the Proposed Action, construction activities such as grading, vegetation removal, excavation, and recontouring of the soil would result in soil disturbance. The Proposed Action would disturb approximately 335 acres of soil.

Implementation of best management practices during construction would limit environmental consequences resulting from vegetation removal and soil-disturbing activities. Fugitive dust from construction activities would be minimized by watering and soil stockpiling, thereby reducing to negligible levels the total amount of soil exposed. Standard erosion control means (silt fencing, sediment traps, application of water sprays, and revegetation of disturbed areas) would also reduce potential environmental impacts. Therefore, impacts from the Proposed Action would not reach the level of significance. In addition, the Proposed Action would not cause or create significant changes to the topography of the DMAFB area. Therefore, no significant impact on regional or local topography or physiographic features would result from implementation of the Proposed Action.

Environmental Protection Measures

No environmental protection measures are required.

4.2.3 Alternative A

Under Alternative A, construction activities such as grading, vegetation removal, excavation, and recontouring of the soil would result in soil disturbance. Alternative A would disturb approximately 216 acres of soil. Alternative A would have similar impacts as the Proposed

Action. However, a total of 119 fewer acres or 40 percent less soil would be disturbed under Alternative A than the Proposed Action.

Environmental Protection Measures

No environmental protection measures are required.

4.2.4 Alternative B

Under Alternative B, construction activities such as grading, vegetation removal, excavation, and recontouring of the soil would result in soil disturbance. Alternative B would disturb approximately 185 acres of soil. Alternative A would have similar impacts as the Proposed Action. However, a total of 150 fewer acres or 45 percent less soil would be disturbed under Alternative B than the Proposed Action.

Environmental Protection Measures

No environmental protection measures are required.

4.2.5 No Action Alternative

Under the No Action Alternative, there would be no change in or effects on geological resources at DMAFB.

4.3 Water Resources

4.3.1 Evaluation Criteria

Evaluation criteria for water resources impacts are based on water availability, quality, and use; existence of floodplains; and associated regulations. A potential impact on water resources would be significant if it were to reduce water availability to existing users or interfere with the supply, create or contribute to overdraft of groundwater basins or exceed safe annual yield of water supply sources, adversely affect water quality or endanger public health by creating or worsening adverse health hazard conditions, threaten or damage unique hydrologic characteristics, or violate established laws or regulations that have been adopted to protect or manage water resources of an area. Significance criteria for impacts on floodplains is based on EO 11988 and the protection of public health and safety. Impacts on floodplains would be significant if the Proposed Action

involved major construction in a floodplain that would substantially damage floodplain resources or would risk public health and safety due to flooding.

4.3.2 Proposed Action

Implementation of the Proposed Action is expected to have adverse effects with regard to some water resources factors, and no adverse effects with regard to other factors.

The Proposed Action would result in a small decrease in the impervious surface area, which would tend to decrease the amount of runoff. Currently, the runway area is drained by storm sewer pipes which then discharge out onto the ground to the west of the runway. Runoff then flows overland until it exits the base at the outfalls described in Section 3.6.2, allowing opportunity for some water to infiltrate before reaching the outfalls. If, under the Proposed Action, project designers are careful to extend the storm sewer pipes only to the edge of the CZ, and not all the way to the outfalls, opportunity for infiltration would still exist.

Soil erosion and the sediment load in storm water are likely to increase due to the removal of vegetation under the Proposed Action. The Proposed Action would result in an increase in the velocity and sediment content of soil runoff into surface waters surrounding the project area. The Proposed Action would have direct impacts on water quality due to vegetation removal and soil disturbance.

Under the Proposed Action, construction best management practices would be used to minimize erosion and sedimentation during project construction. However, there is a reasonable chance that post-construction revegetation, given the desert environment, would take a number of years to be successful. Because vegetation tends to slow the velocity of storm water and hold soil in place, a lack of vegetation in the CZ would increase the velocity and sediment content of the runoff. Even after revegetation is successful, mowing required to maintain the vegetation at a height of no more than 10 inches, would disturb the soil and tend to increase erosion and sedimentation.

The 120-acre Ajo Way Detention Basin, downstream of DMAFB's runway outfalls, is used for flood control. The Ajo Detention Basin Environmental Restoration Project currently under way would eventually restore 27 acres of wetlands and riparian habitat to this basin (Pima County 2004). An increased sediment load in storm water draining into the basin would decrease the

flood storage capacity of the basin over time. It could also negatively impact the establishment and maintenance of wetlands and riparian habitat.

The Proposed Action might also result in an increase in the velocity with which storm water drains from the project area. This can in turn increase erosion and sedimentation. However, this impact can be alleviated with proper engineering design.

Because obstructions must be removed as part of the Proposed Action, existing storm sewer pipes must be extended to outside the CZ, and existing drainage ditches must be replaced by underground pipes covered by a graded land surface. Drainage Areas 007, 009, and 010 contain three, one, and two separate storm sewer networks, respectively, which drain parts of the CZ. Five of these storm sewer networks currently discharge out onto the open ground significantly upstream of their respective outfalls. Under the Proposed Action, these storm sewer networks must be extended to outside the CZ, but they would still be able to discharge upstream of their outfalls. One of the networks in Drainage Area 010 discharges to a ditch that runs to Outfall 010. This network must be extended down the ditch to the outfall (and then buried) because the CZ in this part of Drainage Area 010 extends just up to the outfall.

All of these piping extensions must be carefully designed in terms of slope, size, and roughness coefficient so as not to increase the exit velocities of the storm water to a level that would cause erosion. If exit velocities are too high, exit structures to slow the water, such as riprap or stilling blocks, must be incorporated into the design.

Groundwater. The Proposed Action would have no direct or indirect effects on groundwater quality because the groundwater table is several hundred feet below the ground surface.

Floodplains. If the 2001 drainage study performed for DMAFB is correct, some of the Proposed Action would be within a 100-year floodplain. This floodplain is not due to a low-lying area naturally occurring along an existing river or stream channel, but is likely artificially created by the limiting capacity of the storm drainage infrastructure in the runway area. The Proposed Action would not substantially damage floodplain resources, would not stimulate further development in a floodplain, and is consistent with EO 11988. The 8-step process for compliance with EO 11988 was conducted in conjunction with the public involvement process for this EA (see Section 1.6.3). DMAFB will issue its findings and a public explanation pursuant to the EO in conjunction with the Decision Record for this EA.

Environmental Protection Measures

Adherence to best management practices and applicable codes and ordinances would reduce storm water runoff-related impacts to a level of insignificance. Erosion and sediment controls would be in place during construction to reduce and control siltation or erosion impacts on areas outside of the proposed construction sites.

4.3.3 Alternative A

Soil erosion and the sediment load in storm water are likely to increase due to the removal of vegetation under Alternative A. Alternative A would have less direct impacts on water quality than the Proposed Action due to a lower percentage of vegetation and soil disturbance. Alternative A would result in a small increase in the velocity and sediment content of soil runoff into surface waters surrounding the project area. However, this impact can be alleviated with proper engineering design. In addition, maintaining a portion of the project area's vegetation would stabilize soils in the project area, resulting in less sediment runoff.

Under Alternative A, construction best management practices would be used to minimize erosion and sedimentation during project construction. However, there is a reasonable chance that post-construction revegetation, given the desert environment, would take a number of years to be successful. Because vegetation tends to slow the velocity of storm water and hold soil in place, a lack of vegetation in the CZ would increase the velocity and sediment content of the runoff. Even after revegetation is successful, mowing required to maintain the vegetation at a height of no more than 10 inches would disturb the soil and tend to increase erosion and sedimentation.

The 120-acre Ajo Way Detention Basin, downstream of DMAFB's runway outfalls, is used for flood control. The Ajo Detention Basin Environmental Restoration Project currently under way would eventually restore 27 acres of wetlands and riparian habitat to this basin (Pima County 2004). An increased sediment load in storm water draining into the basin would decrease the flood storage capacity of the basin over time. It could also negatively impact the establishment and maintenance of wetlands and riparian habitat.

Because obstructions must be removed as part of the Proposed Action, existing storm sewer pipes must be extended to outside the CZ, and existing drainage ditches must be replaced by underground pipes covered by a graded land surface. Drainage Areas 007, 009, and 010 contain three, one, and two separate storm sewer networks, respectively, which drain parts of the CZ. Five of these storm sewer networks currently discharge out onto the open ground significantly

upstream of their respective outfalls. Under Alternative A, these storm sewer networks must be extended to outside the CZ, but they would still be able to discharge upstream of their outfalls. One of the networks in Drainage Area 010 discharges to a ditch that runs to Outfall 010. This network must be extended down the ditch to the outfall (and then buried) because the CZ in this part of Drainage Area 010 extends just up to the outfall.

All of these piping extensions must be carefully designed in terms of slope, size, and roughness coefficient so as not to increase the exit velocities of the storm water to a level that would cause erosion. If exit velocities are too high, exit structures to slow the water, such as riprap or stilling blocks, must be incorporated into the design.

Groundwater. Alternative A would have no direct or indirect effects on groundwater quality because the groundwater table is several hundred feet below the ground surface.

Floodplains. Alternative A would have the similar impacts on the 100-year floodplain as the Proposed Action.

Environmental Protection Measures

No environmental protection measures are required.

4.3.4 Alternative B

Soil erosion and the sediment load in storm water are likely to increase due to the removal of vegetation under Alternative B. Alternative B would have less direct impacts on water quality than the Proposed Action due to a lower percentage of vegetation and soil disturbance. Alternative B would result in a small increase in the velocity and sediment content of soil runoff into surface waters surrounding the project area. However, this impact can be alleviated with proper engineering design. In addition, maintaining a portion of the project area's vegetation would stabilize soils in the project area, resulting in less sediment runoff.

Under Alternative B, construction best management practices would be used to minimize erosion and sedimentation during project construction. However, there is a reasonable chance that post-construction revegetation, given the desert environment, would take a number of years to be successful. Because vegetation tends to slow the velocity of storm water and hold soil in place, a lack of vegetation in the CZ would increase the velocity and sediment content of the runoff.

Even after revegetation is successful, mowing required to maintain the vegetation at a height of no more than 10 inches, would disturb the soil and tend to increase erosion and sedimentation.

The 120-acre Ajo Way Detention Basin, downstream of DMAFB's runway outfalls, is used for flood control. The Ajo Detention Basin Environmental Restoration Project currently under way would eventually restore 27 acres of wetlands and riparian habitat to this basin (Pima County 2004). An increased sediment load in storm water draining into the basin would decrease the flood storage capacity of the basin over time. It could also negatively impact the establishment and maintenance of wetlands and riparian habitat.

Because obstructions must be removed as part of the Proposed Action, existing storm sewer pipes must be extended to outside the CZ, and existing drainage ditches must be replaced by underground pipes covered by a graded land surface. Drainage Areas 007, 009, and 010 contain three, one, and two separate storm sewer networks, respectively, which drain parts of the CZ. Five of these storm sewer networks currently discharge out onto the open ground significantly upstream of their respective outfalls. Under Alternative B, these storm sewer networks must be extended to outside the CZ, but they would still be able to discharge upstream of their outfalls. One of the networks in Drainage Area 010 discharges to a ditch that runs to Outfall 010. This network must be extended down the ditch to the outfall (and then buried) because the CZ in this part of Drainage Area 010 extends just up to the outfall.

All of these piping extensions must be carefully designed in terms of slope, size, and roughness coefficient so as not to increase the exit velocities of the storm water to a level that would cause erosion. If exit velocities are too high, exit structures to slow the water, such as riprap or stilling blocks, must be incorporated into the design.

Groundwater. Alternative B would have no direct or indirect effects on groundwater quality because the groundwater table is several hundred feet below the ground surface.

Floodplains. Alternative B would have the similar impacts on the 100-year floodplain as the Proposed Action.

Environmental Protection Measures

No environmental protection measures are required.

4.3.5 No Action Alternative

Under the No Action Alternative, there would be no change in or effects on water resources at DMAFB.

4.4 Biological Resources

4.4.1 Evaluation Criteria

Determination of the significance of potential impact on biological resources is based on the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; the percentage of the resource that would be affected relative to its occurrence in the region; the sensitivity of the resource to proposed activities; and the duration of ecological ramifications. Impacts on biological resources are significant if species or habitats of high concern are adversely affected over relatively large areas, or if disturbances cause reductions in population size or impact the distribution of a species of special concern.

4.4.2 Proposed Action

The removal/modification of the current plant communities within the project area would have direct, adverse impacts on vegetation and species habitat. However, the affected wildlife species are not listed by either USFWS or AGF as threatened, endangered, or candidate species. None of the species identified during the July 2004 surveys (Appendix B) of the project area, or otherwise expected to occur in the project area, are listed by AGF as species of special concern. Furthermore, the area potentially affected (approximately 297 acres) is relatively small for the more vagile species such as Swainson's hawks. Therefore, impacts from the Proposed Action would not be anticipated to reach the level of significance for vegetation; wildlife; or threatened, endangered, candidate, or special status species.

Vegetation Removal

Vegetation. Every reasonable effort would be made to salvage as many of the state-protected species as possible. After salvage, the remaining vegetation would be completely removed from the approximately 297 acres of project area to reduce the safety hazard to aircraft and personnel. After the area has been graded, the site would be prepared and revegetated following the guidelines provided in Appendix B as modified by local experts such as staff at the Natural Resource's Tucson Plant Materials Center. Such revegetation would include seed bed

preparation, use of certified weed-free native grass seed, supplemental watering and cover as needed, frequent monitoring, and rapid implementation of changes indicated by the monitoring. Dust control methods such as soil stabilizers or other methods would be used until vegetative ground cover is re-established. The area would be mowed when needed to keep all vegetation below 10 inches. The contractor would make every effort to avoid impacts on cactus and other sensitive plant species outside the construction impact envelope. Therefore, assuming salvage for the appropriate species, it is anticipated that impacts from this alternative would not be significant.

Wildlife. Preclearance salvage activities would probably drive much of the wildlife currently utilizing the project area to currently undisturbed habitats outside the project area. Every effort would be made to facilitate dispersal of wildlife to such areas and to protect those areas from disturbance. Removal of large trees from the project area would reduce nesting habitat for Swainson's hawks. However, alternative, suitable nesting trees are available in the vicinity of the project area. Establishment of open grassland as proposed under this alternative would actually increase foraging opportunities for this species of hawk. Assuming that tree removal is conducted when the hawks are not nesting (e.g., winter), impacts on wildlife from this alternative should not be significant.

Threatened and Endangered Species. No species designated as threatened, endangered, or candidate species by USFWS, or as species of special concern by AGF, are documented to occur in the project area. Therefore this alternative is not anticipated to have direct or indirect impacts on such species.

Environmental Protection Measures

The following environmental protection measures should be employed under the Proposed Action or either of the action alternatives (Alternative A or B):

- All vegetation modification, including salvage, clearing, revegetation and maintenance, would be coordinated with the 355 CES/CEV.
- A Notice of Intent to Clear Land (Notice) should be filed with the ADA and no preclearance or salvage activities should be allowed on the project area until 60 days after approval of the Notice.
- Any salvage or clearance activities not accomplished within 365 days of Notice approval would be subject to reapplication for approval.

- DMAFB Environmental Office should work with private nurseries and other entities to facilitate salvage of as many individuals of the protected plant species as logistically feasible.
- Large trees which are not salvaged would be cut to ground level and herbicide applied to the cut stump to inhibit resprouting. The stump and root system should be left *in situ* to avoid unnecessary soil disturbance.
- Only native grass seed mixes which are certified weed-free should be used in the revegetation efforts.
- Salvage and clearance activities should be scheduled and monitored to minimize soil disturbance.
- Salvage and clearance activities should be scheduled and monitored to minimize disturbance to wildlife. Particular attention would be paid to avoiding such activities during the reproductive/nesting season.
- Implementation of routine soil erosion and sediment control practices during salvage and clearance activities would effectively prevent increased sedimentation of various ditches carrying storm water out of the project area.
- The use of water or a dust palliative should be employed to reduce suspension of dust particles in the air.
- Soil stabilizers should be employed and maintained until native ground cover is re-established.
- Revegetation should follow the guidelines provided in Appendix B as modified by local experts such as the staff of the NRCS's Tucson Field Office.

4.4.3 Alternative A

Selective removal of vegetation from a smaller area (approximately 177 acres) would reduce the impacts on vegetation and wildlife species habitat. However, under Alternative A, the ditch and hill associated with the perimeter/Columbia Drive would still be brought to grade, representing a substantial disturbance of soil surface. As with the Proposed Action, the affected wildlife species are not listed by either USFWS or AGF as threatened, endangered, or candidate species. None of the species identified during the July 2004 surveys (Appendix B) of the project area, or otherwise expected to occur in the project area, are listed by AGF as species of special concern. As such,

and assuming adherence to all environmental protection measures and revegetation recommendations, impacts from Alternative A would not be anticipated to reach the level of significance for vegetation, wildlife, or threatened, endangered, candidate, or special status species.

Vegetation Removal

Vegetation. Every reasonable effort would be made to salvage as many of the state-protected species as possible. After salvage, all vegetation with a basal diameter greater than 2 inches would be completely removed where it presents a safety hazard to aircraft and personnel and where the vegetation penetrates the imaginary 7H:1V TS slope ratio. The contractor would make every effort to avoid impacts on cactus and other sensitive plant species outside the construction impact envelope. All other vegetation that is within the BRLs and CZs that does not present a safety concern or does not penetrate the imaginary 7H:1V TS slope ratio would obtain a permanent airfield waiver. After selected vegetation has been removed, the affected areas would be revegetated following the guidelines set forth in Appendix B and those provided by local experts such as NRCS staff. It is anticipated that areas 1, 8, and 9 would be completely graded and that approximately 10 percent of the side areas would receive selective vegetation removal. Based on these assumptions, approximately 177 acres of vegetation would be removed in the project area. Dust control methods such as soil stabilizers or other methods would be used until vegetative groundcover is re-established. These areas would be mowed as necessary to keep all vegetation below 10 inches. Over time, this mowing regime would kill the woody species such as creosote bush. It is important that native ground cover be established before the creosote bush dies to avoid soil destabilization and related problems. Assuming salvage of appropriate plant species and reestablishment of native vegetative ground cover to minimize loss of topsoil, impacts from this alternative would not be significant.

Wildlife. As with the Proposed Action, preclearance salvage activity would probably drive many of the wildlife species into neighboring habitats. In contrast to the Proposed Action, however, this alternative would leave some portions of the project area undisturbed or minimally disturbed for a longer period of time, giving wildlife more time to establish new territories outside the project area. As such, Alternative A would have no significant impact on the wildlife species of DMAFB.

Threatened and Endangered Species. No species designated as threatened, endangered, or candidate species by USFWS, or as species of special concern by AGF, are documented to occur

in the project area. Therefore, this alternative would have no direct or indirect impact on such species.

Environmental Protection Measures

Alternative A should follow the same environmental protection measures provided above for the Proposed Action.

4.4.4 Alternative B

Alternative B further reduces disturbance to the vegetated areas around the flightline through deletion of modifications to the ditch and hill associated with the perimeter/Columbia Drive. These two features comprise approximately 31 acres that would be leveled to grade under the Proposed Action or Alternative A. Under Alternative B, while this area would be subjected to selective removal of vegetation as needed, the topography of the site would not be modified. Selective removal of vegetation from approximately 177 acres would still affect local vegetation and wildlife habitat. However, as with the other action alternatives, the affected wildlife species are not listed by either USFWS or AGF as threatened, endangered, or candidate species. None of the species identified during the July 2004 surveys (Appendix B) of the project area, or otherwise expected to occur in the project area, are listed by AGF as species of special concern. The greatest potential for impact under this alternative is the loss of vegetative ground cover. Therefore, assuming adherence to all environmental protection measures and revegetation recommendations, impacts from Alternative B would be anticipated to have the least potential (among the action alternatives) to reach the level of significance for vegetation, wildlife, or threatened, endangered, candidate, or special status species.

Vegetation Removal

Vegetation. Every reasonable effort would be made to salvage as many of the state-protected species as possible. After salvage, all vegetation with a basal diameter greater than 2 inches would be completely removed where it presents a safety hazard to aircraft and personnel and where the vegetation penetrates the imaginary 7H:1V TS slope ratio. The contractor would make every effort to avoid impacts on cactus and other sensitive plant species outside the construction impact envelope. All other vegetation that is within the BRLs and CZs that does not present a safety concern or does not penetrate the imaginary 7H:1V TS slope ratio would obtain a permanent airfield waiver. After selected vegetation has been removed, the affected areas would be revegetated following the guidelines set forth in Appendix B and those provided by local

experts such as NRCS staff. It is anticipated that areas 1, 8, and 9 would be completely graded and that approximately 10 percent of the side areas would receive selective vegetation removal. Based on these assumptions, approximately 177 acres of vegetation would be removed in the project area. Dust control methods such as soil stabilizers or other methods would be used until vegetative groundcover is re-established. These areas would be mowed as necessary to keep all vegetation below 10 inches. Over time, this mowing regime would kill the woody species such as creosote bush. It is important that native ground cover be established before the creosote bush dies to avoid soil destabilization and related problems. Assuming salvage of appropriate plant species and re-establishment of native vegetative ground cover to minimize loss of topsoil, impacts from this alternative would not be significant.

Wildlife. As with the Proposed Action, preclearance salvage activity would probably drive many of the wildlife species into neighboring habitats. In contrast to the Proposed Action, however, this alternative would leave some portions of the project area undisturbed or minimally disturbed for a longer period of time, giving wildlife more time to establish new territories outside the project area. Leveling of the ditch and hill associated with Columbia Drive would not occur under this Alternative, which would further reduce the impacts to local wildlife and habitat. As such, Alternative B would not be anticipated to have significant impacts on the wildlife species of DMAFB.

Threatened and Endangered Species. No species designated as threatened, endangered, or candidate species by USFWS, or as species of special concern by AGF, are documented to occur in the project area. Therefore, this alternative would have no direct or indirect impact on such species.

Environmental Protection Measures

Alternative B should follow the same environmental protection measures provided above for the Proposed Action and Alternative A.

4.4.5 No Action Alternative

Vegetation. Under the No Action Alternative, no measures would be taken to bring DMAFB into conformance with UFC 3-260-01 or FAR Part 77. Vegetation would continue to be trimmed as necessary to prevent penetration of the imaginary 34-foot horizontal to 1-foot vertical (34H:1V) surface required to maintain Category II ILS capabilities (see discussion in Section 1.2.4), but no action would be taken to ensure clearance of the lower 50H:1V imaginary surface and other

imaginary surfaces required in UFC 3-260-01 or FAR Part 77. As such, this alternative would have no significant impact on the native vegetation of DMAFB.

Wildlife. No habitat alteration would result from the No Action Alternative. Therefore this alternative would have no impact on the wildlife populations of DMAFB.

Threatened and Endangered Species. No species designated as threatened, endangered, or candidate species by USFWS, or as species of special concern by AGF, are documented to occur in the project area. Therefore, this alternative would have no impact on such species.

4.5 Hazardous Materials and Wastes Management

4.5.1 Evaluation Criteria

Numerous local, state, and Federal laws regulate the storage, handling, disposal, and transportation of hazardous material and waste. The primary purpose of these laws is to protect public health and the environment. Environmental consequences associated with hazardous material and waste would be significant if the storage, use, transportation, or disposal of these substances were to substantially increase the risk to human health or exposure to the environment.

4.5.2 Proposed Action

Hazardous Materials. Construction activities associated with the Proposed Action would require the use of certain hazardous materials such as paints, welding gases, solvents, preservatives, and sealants. It is anticipated that the quantity of products containing hazardous materials used during construction activities would be minimal and their use would be of short duration. Contractors would be responsible for the management of hazardous materials, which would be handled in accordance with Federal and state regulations. During project activities, contractors would be required to minimize the potential for a release of hazardous substances from all construction equipment, to include daily inspection of equipment to ensure that there are no discharges, maintaining appropriate spill containment material on site, and storing all fuels and other materials in appropriate containers. Equipment maintenance activities would not be conducted on the construction site. Therefore, hazardous materials management at DMAFB would not be impacted by the proposed construction activities.

Hazardous Wastes. It is anticipated that the quantity of hazardous wastes generated from proposed construction activities would be negligible. Contractors would be responsible for the

disposal of hazardous wastes in accordance with Federal and state laws and regulations. Construction of the proposed facilities would not impact the DMAFB hazardous waste management program.

Asbestos and Lead-based Paint. Any ACM or lead-based paint encountered during demolition of buildings would be handled in accordance with established USAF policy and the *Asbestos Management and Operations Plan* or *Lead Based Paint Management Plan*. It is anticipated that some of the structures associated with demolition contain ACM and lead-based paints.

Pollution Prevention. It is anticipated that the Proposed Action would not impact the pollution prevention program at DMAFB. Quantities of hazardous material and chemical purchases, off-base transport of hazardous waste, disposal of MSW, and energy consumption would remain unchanged under with implementation of the Proposed Action. The Pollution Prevention Program at DMAFB would accommodate the Proposed Action.

ERP. As discussed in Section 3, there are three open ERP sites in the project area. These sites are described in more detail below:

- LF-01 is a landfill pit created in the early 1940s as a borrow source for gravel aggregate needed to construct the runway. This pit as used until 1976 for disposal of wastes including household garbage, metals, cars and aircraft, paint residue, thinners and solvents,oil, fuel tank sludge, pesticides, and photo lab chemicals. Since 1976, these wastes have been hauled off-base. This site is open and is being monitored. Soil samples from this site contained concentrations of pesticides, VOCs, oil, and grease. Remedial design to manage landfill gases and alter the drainage in this site was implemented in 1998 and remedial action was completed in 2000.
- DP-10 allegedly received chemical sludge that was disposed in shallow trenches from 1970 to 1976. This site consists of approximately 10 trenches. The sludge is thought to be from fuel tank cleaning. No study of this site has been completed because it is considered contiguous to LF-01. This site will be remediated in conjunction with LF-01.
- ST-35 is near the center of the flightline and most of the site is paved. This site contains an estimate of 60,000 cubic yards of soil contamination with JP-4 jet fuel present in the subsurface and fuel pumps and a 6-inch product line approximately 5 feet below the ground surface. ST-35 is currently being treated for both soil and groundwater

contamination. Installation of additional remediation wells has been scheduled and further evaluations to determine the extent of the contamination are anticipated.

Environmental Protection Measures

Because of the potential to construction workers of contamination from ERP sites during construction, it is recommended that a health and safety plan be prepared in accordance with OSHA requirements prior to commencement of construction activities. In addition, should contamination be encountered, handling, storage, transportation, and disposal activities would be conducted in accordance with applicable Federal, state, and local regulations; AFIs; and DM AFB programs and procedures. Workers within ERP sites should either have OSHA 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training, or a supervisor should have OSHA Site Supervisor certification.

4.5.3 Alternative A

Alternative A would have the same impacts as the Proposed Action to hazardous materials, hazardous wastes, asbestos and lead-based paint, pollution prevention, and ERP.

Environmental Protection Measures

Alternative A should follow the same environmental protection measures mentioned above for the Proposed Action.

4.5.4 Alternative B

Alternative B would have the same impacts as the Proposed Action and Alternative A to hazardous materials, hazardous wastes, asbestos and lead-based paint, pollution prevention, and ERP.

Environmental Protection Measures

Alternative B should follow the same environmental protection measures mentioned above for the Proposed Action.

4.5.5 No Action Alternative

Under the No Action Alternative, there would be no change in or effects on hazardous materials and wastes management at DMAFB.

4.6 Infrastructure

4.6.1 Evaluation Criteria

Impacts on infrastructure are evaluated on their potential for disruption or improvement of existing levels of service and additional needs for energy and water consumption, wastewater systems, and transportation patterns and circulation. Impacts might arise from physical changes to circulation, construction activities, introduction of construction-related traffic on local roads, changes in daily or peak-hour traffic volumes, and energy needs created by either direct or indirect workforce and population changes related to base activities.

4.6.2 Proposed Action

Airfield. The Proposed Action would have a positive impact on the safety and operation of the airfield by base mission units. All activities related to the Proposed Action would be coordinated with Airfield Management and Environmental Flight prior to commencing construction activities. Special care must be taken during removal of vegetation, moving culverts, filling in ditches, and demolishing Columbia Drive and the hill obstacle so that fugitive dust emissions do not shut down mission operations because of lack of visibility. If dust control methods are not used prior, during, and after construction, the Proposed Action could have an adverse effect on base mission operations. However, if these methods are used, there would be no adverse impact on airfield operations from the Proposed Action.

Transportation Systems. The C&D phase of the Proposed Action would require delivery of materials to and removal of debris from construction sites. Construction traffic would comprise a small percentage of the total existing traffic and many of the vehicles would be driven to and kept on-site for the duration of C&D, resulting in relatively few additional trips. Furthermore, potential increases in traffic volume associated with proposed construction activity would be temporary. Heavy vehicles are frequently on base roads. Therefore the vehicles necessary for construction are not expected to have a heavy impact on base roads. All road and lane closures would be coordinated with 355 Transportation Squadron and 355 Airfield Management and would be temporary in nature; therefore, no adverse impacts on transportation systems would be expected.

Storm Water Systems. The Proposed Action would necessitate the construction of an underground storm sewer system to convey storm water discharges to Outfalls 007A, B, and C

and Outfall 010; these outfalls currently receive overland storm water flow. In addition, an engineering study would have to be completed to ensure that the increased flow rate, which occurs as a result of conveying storm water through concrete conveyances as opposed to grassy swales/drainage ditches, does not cause erosion, sedimentation, or other adverse impacts.

Liquid Fuel Systems. The Proposed Action would involve demolishing two fuel pumphouses. Demolishing these facilities would not have an adverse impact on the liquid fuel system at DMAFB.

Solid Waste. In considering the basis for evaluating the significance of impacts on solid waste, several items are considered. These items include evaluating the degree to which the proposed construction projects could affect the existing solid waste management program and capacity of the area landfill. Solid waste generated from the proposed construction activities would consist of building materials such as solid pieces of concrete, metals (conduit, piping, and wiring), and lumber. The landfill space required at an approved landfill used by the contractor would increase over the next 2 years (CY 2005 and CY 2006). The landfills near the base have the capacity to handle the additional C&D solid waste stream from the Proposed Action. Therefore, implementation of the Proposed Action at DMAFB would not impact the solid waste management program at the base or the capacity of surrounding landfills.

Environmental Protection Measures

No environmental protection measures are required.

4.6.3 Alternative A

Alternative A would have the same impacts as the Proposed Action to airfield, transportation systems, liquid fuel systems, storm water systems, and solid waste.

Environmental Protection Measures

No environmental protection measures are required.

4.6.4 Alternative B

Alternative B would have the same impacts as the Proposed Action and Alternative A to airfield, transportation systems, liquid fuel systems, storm water systems, and solid waste.

Environmental Protection Measures

No environmental protection measures are required.

4.6.5 No Action Alternative

Under the No Action Alternative, there would be no change in or effects on infrastructure at DMAFB. However, the airfield at DMAFB would remain out of compliance with UFC 3-260-01 and FAR Part 77 standards. To ensure safe airfield operation and conform to USAF and FAA guidance, the USAF would have to curtail or discontinue flight operations at DMAFB.

4.7 Safety

4.7.1 Evaluation Criteria

If implementation of the Proposed Action were to substantially increase risks associated with the safety of DMAFB personnel, contractors, or the local community, or substantially hinder the ability to respond to an emergency, it would represent a significant impact. Furthermore, if implementation of the Proposed Action would result in incompatible land use with respect to safety criteria (e.g., height restrictions), impacts on safety would be significant. Impacts were assessed based on the potential effects of C&D activities.

4.7.2 Proposed Action

Short-term, minor adverse effects would be expected. Implementation of the Proposed Action would slightly increase the short-term risk associated with construction contractors performing work at DMAFB during the normal workday because the level of such activity would increase. Contractors would be required to establish and maintain safety programs. Projects associated with the Proposed Action would not pose a safety risk to base personnel or activities at the base. The proposed construction projects would enable 355 WG to meet future mission objectives at the base and conduct or meet mission requirements in a safe operating environment.

During construction activities associated with the Proposed Action, construction workers could encounter UXO or CAIS, especially in the vicinity of Training Areas 1 and 2. Preliminary assessments and site investigations have yet to be fully undertaken, and the extent and character of contamination from UXO on DMAFB is still being determined. An ERP waiver approved by HQ ACC is required prior to accomplishing any work on or near a range. The 355 CES/CEV

staff should be contacted prior to commencing construction activities to determine if an ERP waiver is required for the Proposed Action for all proposed work on or near range sites and for safety requirements that would need to be followed during construction.

The Proposed Action would provide a positive impact on the base by improving the safety of aircraft and personnel at the DMAFB. In addition, the Proposed Action would reduce the potential of aircraft mishaps and harm to base personnel and facilities.

Environmental Protection Measures

No environmental protection measures are required.

4.7.3 Alternative A

Alternative A would have the same impacts as the Proposed Action to construction worker, aircraft, and personnel safety.

Environmental Protection Measures

No environmental protection measures are required.

4.7.4 Alternative B

Alternative B would have the same impacts as the Proposed Action and Alternative A to construction worker, aircraft, and personnel safety.

Environmental Protection Measures

No environmental protection measures are required.

4.7.5 No Action Alternative

Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. However, the safety of aircraft and base personnel could be compromised and the DMAFB would remain out of compliance with UFC 3-260-01 and FAR Part 77 standards. To ensure safe aircraft operation and conform to USAF and FAA guidance, the USAF would have to curtail or discontinue flight operations at DMAFB.

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5. Cumulative and Adverse Impacts

Cumulative impacts on environmental resources result from incremental effects of proposed actions, when combined with other past, present, and reasonably foreseeable future projects in the area. Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (Federal, state, and local) or individuals. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

Other projects to evaluate in the cumulative impact analysis were identified through a review of public documents, information gained from the IICEP, and coordination with multiple agencies. During the timeframe of the Proposed Action, Alternative A, or Alternative B, 355 WG would be constructing an Aviation Gasoline secondary containment pad near Taxiway D, Hazardous Cargo Pad southwest of Runway 30, and a new Live Load Area northwest of Runway 12. These small projects do not have the potential to combine with the Proposed Action or Alternative A to form a significant impact.

5.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts would result from implementation of the Proposed Action, Alternative A, or Alternative B. None of these impacts would be significant.

Geological Resources. Under the Proposed Action and Alternatives A and B, construction activities, such as grading, excavating, and recontouring of the soil, would result in soil disturbance. Implementation of best management practices during construction would limit environmental consequences resulting from construction activities. Standard erosion control means would also reduce environmental consequences related to these characteristics. Although unavoidable, impacts on soils at the base are not considered significant.

Water Resources. The Proposed Action and Alternatives A and B would result in an increased rate of flow of storm water to and through Outfall 010. However, with development and subsequent implementation of engineering practices to slow down the flow of water to this outfall, the impact is not considered significant.

Biological Resources. The Proposed Action and Alternatives A and B would result in a loss of vegetation and wildlife habitat within the vicinity of the airfield CZs.

Hazardous Materials and Wastes. The generation of hazardous materials and wastes are unavoidable conditions associated with the Proposed Action or Alternatives A and B. However, the potential for these unavoidable situations would not significantly increase over baseline conditions and, therefore, are not considered significant.

Energy. The use of nonrenewable resources is an unavoidable occurrence, although not considered significant. The Proposed Action and Alternatives A and B would require the use of fossil fuels, a nonrenewable natural resource. Energy supplies, although relatively small, would be committed to the Proposed Action, Alternative A, Alternative B, or No Action Alternative.

5.2 Compatibility of the Proposed Action and Alternatives with the Objectives of Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

Impacts on the ground surface as a result of the Proposed Action and Alternatives A and B would occur entirely within the boundaries of DMAFB. Construction activities would not result in any significant or incompatible land use changes on or off base. Consequently, construction activities would not be in conflict with base land use policies or objectives. In addition, the Proposed Action and Alternatives A and B would not conflict with any applicable off-base land use ordinances or designated CZs.

5.3 Relationship Between Short-term Use and Long-term Productivity

Short-term uses of the biophysical components of man's environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period of less than 5 years. Long-term uses of man's environment include those impacts occurring over a period of more than 5 years, including permanent resource loss.

Several kinds of activities could result in short-term resource uses that compromise long-term productivity. Loss of especially important habitats and consumptive use of high-quality water at nonrenewable rates are examples of actions that affect long-term productivity.

The Proposed Action and Alternatives A and B would not result in an intensification of land use at DMAFB and in the surrounding area. Development of the Proposed Action or Alternatives A and B would not represent a significant loss of open space. The sites are designated as airfield CZs to the base and were not planned for use as open space. Therefore, it is anticipated that the Proposed Action and Alternatives A and B would not result in any cumulative land use or aesthetic impacts.

5.4 Irreversible and Irretrievable Commitments of Resources

The irreversible environmental changes that would result from implementation of the Proposed Action or Alternatives A or B involve the consumption of material resources, energy resources, land, biological habitat, and human resources. The use of these resources is considered to be permanent.

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources will have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame (e.g., energy and minerals).

Material Resources. Material resources utilized for the Proposed Action or Alternatives A or B include building materials (for construction of facilities), concrete and asphalt (for roads), and various material supplies (for infrastructure). Most of the materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

Energy Resources. Energy resources utilized for the Proposed Action or Alternatives A or B would be irretrievably lost. These include petroleum-based products (such as gasoline and diesel), natural gas, and electricity. During construction, gasoline and diesel would be used for the operation of construction vehicles. During operation, gasoline would be used for the operation of private and government-owned vehicles. Natural gas and electricity would be used by operational activities. Consumption of these energy resources would not place a significant demand on their availability in the region. Therefore, no significant impacts would be expected.

Biological Resources. The Proposed Action could result in 297 acres of lost vegetation and wildlife habitat on proposed construction sites. Alternative A and Alternative B could result in 177 acres of lost vegetation and wildlife habitat on proposed construction sites.

Human Resources. The use of human resources for construction and operation is considered an irretrievable loss, only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for the Proposed Action and Alternatives A and B represents employment opportunities, and is considered beneficial.

6. List of Preparers

This EA has been prepared under the direction of DMAFB. The individuals who contributed to the preparation of this document are listed below.

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7. References

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APPENDIX A

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING AND NOTICE OF AVAILABILITY

**REMOVAL OF OBJECTS ALONG FLIGHTLINE AT DAVIS-MONTHAN AFB,
ARIZONA
INTERAGENCY AND INTERGOVERNMENTAL COORDINATION
FOR ENVIRONMENTAL PLANNING CORRESPONDENCE LIST**

Federal – Headquarters Level

Horst Greczmiel
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County Level

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Quality
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Tucson, AZ 85701

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<<Date>>

<<Name>>

<<Title>>

<<Company>>

<<Address1>>

<<Address2>>

<<CityStateZip>

Dear <<Name>>:

The 355th Airlift Wing (355 AW) is preparing an Environmental Assessment (EA) of Remove Objects Along Flightline at Davis-Monthan Air Force Base, Arizona. The Preliminary Draft EA is included with this correspondence as Attachment 1.

The environmental impact analysis process for this proposal is being conducted by the Air Combat Command in accordance with the Council on Environmental Quality guidelines pursuant to the requirements of the National Environmental Policy Act of 1969. In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs*, we request your participation by reviewing the attached DOPAA and solicit your comments concerning the proposal and any potential environmental consequences. Please provide written comments or information regarding the action at your earliest convenience but no later than 30 days from the date of this letter. Also enclosed is a listing of those Federal, state, and local agencies that have been contacted (see Attachment 2). If there are any additional agencies that you feel should review and comment on the proposal, please include them in your distribution of this letter and the attached materials.

Please address questions concerning or comments on the proposal to our consultant, engineering-environmental Management, Inc. (e²M). The point-of-contact at e²M is Mr. Sean McCain. He can be reached at (916) 852-7792. Please forward your written comments to Mr. McCain, in care of engineering-environmental Management, Inc. (e²M), 11171 Sun Center Drive, Suite 210, Rancho Cordova, California 95670. Thank you for your assistance.

Sincerely,

engineering-environmental Management, Inc.

Sean A. McCain
Project Manager

Attachment: Final EA of Remove Objects Along Flightline at Davis-Monthan Air Force Base,
Arizona and Draft FONSI/FONPA

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The Draft Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA) and Environmental Assessment (EA) were made available for public review from 4 February 2005 through 3 March 2005. The below Notice of Availability was published in the *Desert Airman* on 4 February 2005.

PUBLIC NOTICE

**Notice of Availability
Draft Finding of No Significant Impact for the
Environmental Assessment of Remove Objects Along
Flightline at
Davis Monthan Air Force Base, Arizona**

Davis-Monthan AFB, Arizona – An Environmental Assessment (EA) of Remove Objects Along Flightline at Davis-Monthan Air Force Base, Arizona has been prepared. The 355th Wing (WG) is proposing to issue a Finding of No Significant Impact (FONSI) based on this EA. The analysis considered potential effects of the Proposed Action, Alternative A, Alternative B, and the No Action Alternative on seven resource areas: air quality, geological resources, water resources, biological resources, hazardous materials and wastes management, infrastructure, and safety. The results, as found in the EA, show that the Proposed Action would not have an adverse impact on the environment – indicating that a FONSI would be appropriate. An Environmental Impact Statement should not be necessary to implement the Proposed Action.

Copies of the Draft FONSI and EA showing the analysis are available at Environmental Flight (355 CES/CEV) for review.

Public comments on the Draft FONSI and EA will be accepted through March 3, 2005.

Written comments and inquiries on the FONSI and EA should be directed to Dr. Charles Miller, 355 CES/CEV, 5285 E. Madera Street, Davis-Monthan AFB, AZ, 85707-4927.

In addition, the following Privacy Advisory was published as part of the Cover Sheet to the EA made available for public and agency review:

Privacy Advisory

Your comments on this EA are requested. Letters or other written comments provided may be published in the EA. Comments will normally be addressed in the EA and made available to the public. Any personal information provided will be used only to identify your desire to make a statement during the public comment period or to fulfill requests for copies of the EA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the EA. However, only the names of the individuals making comments and specific comments will be disclosed; personal home addresses and phone numbers will not be published in the EA.

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DEPARTMENT OF ENVIRONMENTAL QUALITY

150 West Congress Street
Tucson, Arizona 85701-1317

Ursula Kramer
Director

(520) 740-3340
FAX (520) 882-7709

February 3, 2005

Mr. Sean A. McCain
e²M engineering-environmental Management, Inc.
3358 Mather Field Road
Rancho Cordova, California 95670

RE: Final Environmental Assessment of Remove Objects Along Flightline at Davis-Monthan Air Force Base, Arizona

Dear Mr. McCain:

Thank you for the opportunity to comment and offer suggestions regarding the planned project to Remove Objects Along Flightline at Davis-Monthan AFB, Arizona. The project activities that Pima County Environmental Services Department (PCESD), formally Pima County Environmental Quality (PDEQ), permits and enforces are:

1. Air Quality Activity Operating Permit

Pima County Code (P.C.C.) Title 17 requires Air Quality Activity Operating Permits for Road Construction, Trenching and Landclearing/Earthmoving over threshold amounts. A permit must be obtained prior to starting the activity.

2. Fugitive Emissions

Measures must be in place to control fugitive dust generated at the project. Dust control is required twenty-four hours a day, seven days a week. Effective January 3, 2003, the PDEQ Natural Events Action Plan became effective. The rule includes a 20% opacity standard.

P.C.C. Title 17 applies to your project:

17.16 Emission Limiting Standards

Article II. Visible Emission Standard

Article V. Emissions from New and Existing Portable Sources

Letter to Sean A. McCain

RE: Remove Objects Along Flightline at Davis-Monthan AFB

February 3, 2005

Page Two

3. Asbestos/NESHAP (National Emissions Standards for Hazardous Air Pollutants)

If your project requires demolition or renovation of a NESHAP Facility, you will be required to comply with Title 40, Part 61 and Subpart M of the Code of Federal Regulations National Emissions Standards for Asbestos. You will be required to submit a NESHAP Notification at least ten days prior to starting demolition or renovation and obtain a PDES Asbestos Removal/Demolition Permit.

4. Arizona Pollutant Discharge Elimination System

Based on the scope of proposed activity, coverage under the Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit may be necessary. This is a requirement if the area disturbed is one acre or greater. A Notice of Intent must be submitted to ADEQ.

Pima County Code Title 17 is available for your reference on our WEBSITE at: WWW.ESD.PIMA.GOV. If you have questions regarding permits and compliance, you may contact Business Assistance at (520) 740-3340. Once again, thank you for the opportunity to comment.

Sincerely,

A handwritten signature in cursive script that reads "Ursula Kramer".

Ursula Kramer
Director

APPENDIX B

Biological Field Survey Report

Revegetation Guidelines

Notice of Intent to Clear Land

Biological Field Survey Report Remove Objects Along Flightline at Davis-Monthan AFB, Arizona

A field survey of the project area was conducted by an e²M biologist on 27-28 July 2004. The entire project area was divided into nine survey areas using a true-color satellite image provided by the Base's GIS office. The boundaries of each area were delineated based on roads and feasibility as potential management units and not on plant communities (habitats). The survey was conducted by walking circular transects through each area delineated on Figure 3-2, providing 60-90 percent coverage of the project area, depending on area size and vegetation. Areas 1-5 were surveyed on 27 June. As each of these areas were walked, ground truthing of the photo interpretation effort was accomplished by observing vegetation and land features. Dominant vegetation and wildlife species that were observed during the ground truth effort were recorded for each area. Areas 8 and 9 were similarly analyzed on 28 July. The plant communities of Areas 6 and 7 were characterized by photo interpretation based on the two days of ground-truthing. Table C-1 describes the surveyed areas in more detail.

The plant community gradually shifts from a creosote bush (*Larrea tridentata*)-dominated matrix at the northern end of the project area, to a cactus-dominated matrix at the southern end. Area 1 is predominantly creosote bush with only scattered barrel cacti (*Ferocactus wislizeni*; estimate of ~20 individuals for all of area 1), and very infrequent (only two observed) pencil cholla (*Cylindropuntia*) nestled in creosote bush individuals. No pricklypear (*Opuntia*) or cholla were observed in this area. In contrast, Area 4, which is closer to the middle of the project zone and is smaller than some of the other survey areas, supports estimates of well over 100 cholla, close to 30 prickly pear, and approximately 65-70 barrel cacti. Obtaining a count of individual cacti in Area 8 at the southern end of the project zone was impractical given the density of prickly pear and cholla which obscured many barrel cacti and smaller hedgehog cacti (*Echinocereus coccineus*, *E. fasciculatus*, and *E. stramineus* observed). Estimated density of barrel cacti in the cactus-dominated portions of this area is eight cacti/100 ft².

Mesic sites throughout the project area, whether outfalls from drainage pipes, "natural" washes, or simply low-lying areas, commonly support concentrations of desert broom (*Baccharis sarothroides*), mesquites (*Prosopis glandulosa* and *P. velutina*) and palo verde (*Cercidium floridum*). Tree density and size of individual trees is greatest in Areas 8 and 9, at the south end

of the project area (within the Clear Zone for Runway 30). These relatively high tree densities correspond to a constructed drainage through the two areas which provides sufficient moisture to support such growth.

Table C-1. Description of Surveyed Areas

AREA	VEGETATION TYPE	AREA SIZE (ACRES)	
Area 1	Baccharis/Tree	0.81	
Area 1	Baccharis/Tree	1.47	
Area 1	Baccharis	2.59	
Area 1	Baccharis/Tree	2.05	
Area 1	Tree	0.6	
Area 1	Baccharis	0.92	
Area 1	Creosote Bush	43.65	
Area 1	Baccharis/Tree	1.75	
Area 1	Baccharis/Tree	3.17	Subtotal: 57.01
Area 2	Creosote Bush	8.72	
Area 2	Baccharis/Tree	2.23	
Area 2	Cactus/Creosote Bush	16.51	
Area 2	Cactus/Creosote Bush	5.99	
Area 2	Cactus/Creosote Bush	2.64	
Area 2	Baccharis/Tree	0.79	Subtotal: 36.88
Area 3	Baccharis/Tree	1.09	
Area 3	Tree	0.34	
Area 3	Creosote Bush	12.49	Subtotal: 13.92
Area 4	Cactus/Creosote Bush	13.91	Subtotal: 13.91
Area 5	Cactus	13.03	
Area 5	Baccharis	1.03	
Area 5	Cactus	5.61	
Area 5	Baccharis/Tree	0.97	
Area 5A	Cactus/Tree	1.35	Subtotal: 21.99
Area 6	Cactus	9.31	
Area 6	Cactus	10.76	
Area 6	Baccharis/Tree	6.05	Subtotal: 26.12
Area 7	Cactus/Creosote Bush	19.82	Subtotal: 19.82
Area 8	Creosote Bush	12.1	
Area 8	Cactus	20.42	
Area 8	Baccharis/Tree	8.83	
Area 8	Cactus	29.91	
Area 8	Creosote Bush	3.11	Subtotal: 74.37
Area 9	Cactus	5.84	
Area 9	Baccharis/Tree	6.79	
Area 9	Cactus/Creosote Bush	20.34	Subtotal: 32.97
			Grand Total: 296.99

The following discussion addresses alternatives, concerns, and suggestions relative to vegetation removal only. It does not address structure (buildings, navigational aids, etc.) removal or changes in topography. The changes in topography should be addressed in the Environmental Assessment, particularly as it pertains to storm water drainage patterns on the affected side of the base.

Based on meetings with Gwen Lisa (Environmental) and Ed Leuty (Base Ops), there appear to be three major alternatives for removal of vegetation obstacles from the project zone.

- 1) No Action
- 2) Selective removal – Selectively remove all vegetation that is 2” or greater in diameter and mow the rest (further discussion of this option provided below).
- 3) Complete removal – bulldoze/grade the entire area.

Alternative 1 – No Action

The No Action alternative would mean all conditions and practices would remain as they currently exist. This alternative would not allow the Base to meet the requirements for flight line clearance put forth by the USAF and FAA in UFC 3-260-01 and FAR Part 77, respectively. However, given the cost of either Alternative 2 Selective Removal or Alternative 3 Complete Removal, and the fact that there have been no object-related accidents on the flightline as it exists, the No Action alternative may be seen as viable from some perspectives; at least until such time as the mission of the base changes in a direction that makes such accidents more likely.

Alternative 2 – Selective Removal

Alternative 2 – Selective Removal, could be a functional compromise between the No Action and the Complete Removal alternatives (Alternatives 1 and 3 respectively), depending on its implementation. Under this alternative, all vegetation that is 2” or larger in diameter will be removed. The remaining vegetation would be mowed on a periodic basis to maintain a height range of 6-10 inches. Over time, mowing of this frequency will kill the woody species such as creosote bush. It is important that some plant cover be in place before frequent mowing to avoid soil destabilization and consequent erosion and dust problems. The primary concerns for this alternative are addressed below.

The area to be cleared supports substantial populations of state-protected species, as described above (i.e. all cacti, mesquite and palo verde are state-protected in Arizona). Before any clearing

activities can commence, the base will need to file a Notice of Intent to Clear Land (available online at <http://agriculture.state.az.us/PSD/clearland.pdf>) with the State Office of the Arizona Department of Agriculture. A copy of this form is included in Appendix B for your convenience. This form can be electronically submitted to Carol Chancey (telephone number 602-364-0935) for approval. From the date the application is approved the base must wait 60 days before any clearing or salvage activities in the project area can begin. Any clearing or salvage activities not completed within 365 days of permit approval will require re-permitting. When the base is ready to initiate the permitting phase for this project, Ms. Chancey can provide contact information for a number of plant nurseries with which the state often cooperates for such salvage projects. These nurseries would know how to proceed with getting the Blue Seal permits required to access the Base and salvage the plant material; thereby removing some of the work burden from the Base's environmental staff. It might be worth exploring the possibility of generating some revenue from the salvage activities that could then be used in the revegetation/soil stabilization efforts.

A number of wildlife species utilize the project area. There is an active Swainson's hawk (state-protected) nest toward the south end of the area, and numerous Gambel's quail, black-tailed jackrabbits, cottontails, and roadrunners were observed during the 2-day field session. In addition, javelina tracks were observed, particularly along the south end of the site. Modifying the vegetation in the entire area at one time, whether by selective or complete removal, will displace a large number of individuals and species in an area where suitable habitat is becoming more and more disconnected and scarce.

The soils in the project area appear to have a high potential for erosion. There was considerable evidence of sheet erosion, even after relatively minor rains and with a coalesced plant community. If large areas of these soils are disturbed through vegetation removal activities, there is a substantial risk of erosion and, perhaps more importantly, development of dust problems which could impact flight activities, and contribute to air quality issues. Selecting methods of vegetation removal which would minimize soil disturbance (e.g. cut-stump treatment versus entire tree extraction) can help ameliorate these risks, as would conducting the project in phases as opposed to an all-at-one-time approach.

In general, whether the selective or complete removal alternative is selected, it would be prudent to conduct this project in stages. Airfield management indicated that the Clear Zone for Runway 30 is the highest priority. One suggestion would be to start with Area 9 for salvage, clearing, and

rehabilitation. Based on results from Area 9, proceed with the “treatments” (salvage, clearing, and rehabilitating) of the other areas sequentially from the south end to the north; allowing sufficient time between each treatment to evaluate and apply information from the results of the previous treatments. It is understood that this would require considerable time to accomplish the entire project (minimum of 10 years). However, such an approach would accomplish the following.

1. Reduce overall erosion and air quality risks.
2. Increase the number of protected plant species salvaged by allowing a greater period of time for the salvage to occur which would reduce flooding of local markets.
3. Facilitate movement of wildlife out of the affected area and into surrounding suitable habitats.
4. Reduce the upfront cost by spreading the necessary funding out over a longer period of time.

The above approach would lead to compliance with USAF and FAA airfield criteria as set forth in UFC 3-260-01 and FAR, Part 77, while minimizing the environmental impacts of the project.

Alternative 3 – Complete Removal

Grading the entire area, even if accomplished in small stages, would increase the impacts to surface soils and their ability to support plant cover. In the long run, it is anticipated that this approach would have far greater, and more costly environmental impacts.

REVEGETATION GUIDELINES

Revegetating disturbed sites in the Sonoran Desert is a delicate and unpredictable process because of low and infrequent precipitation and high evapotranspiration demand. Under natural conditions, the colonization of disturbed sites by native vegetation may take tens to hundreds of years because of the harsh conditions. Therefore, active revegetation would be necessary to rehabilitate the disturbed areas.

Revegetation success is enhanced by following proven procedures for arid lands. Revegetation efforts should consist of reseeding with native grasses; the addition of mulch and netting on steep slopes to hold the seed in place; monitoring the revegetated sites; watering and reseeding as

necessary; and control of invasive species as needed to support establishment and vigor of native plant communities.

Soil preparation is very important. The sites that need revegetating should first be contoured to bring them in compliance with the surrounding landscape. If soil compaction has occurred, the soil surface needs to be ripped to a depth of up to 12 inches.

The seeding should be conducted using a hand-held seeder to ensure that the seed is distributed evenly over the entire area. A rough soil surface with crevices and rocks is preferable because they will create “micro sites” for the seed to lodge in and for collection of soil water. Once the seeds germinate, the crevices and rocks provide protection to the seedlings from the sun and wind. On steep slopes it may be necessary to use a mulch, landscape blanket or other means to ensure that seeds are not washed away with the rains, and to reduce the potential for soil erosion.

Native seeds should be seeded at a rate of 14–16 pounds of pure live seed per acre. The seed should be mixed with inert sand to insure good distribution from the hand-held seeder. Appropriate grasses may include gramas (*Bouteloua rothrockii*, *B. californica*, *B. radicata*, *B. filiformis*, *B. parryi*, *B. barbata*), three-awns (*Aristida hamulosa*, *A. wrightii*, *A. ternipes*, *A. aristoides*), false grama (*Cathestecum erectum*), ganglehead grass (*Heteropogon contortus*), and windmill grasses (*Chloris* spp.).

It is preferable to use seed harvested from plant communities as close to the sites as possible. Preferably, seed should be collected from the surrounding plant community when seeds are ripe. Seeds must be cleaned and stored properly to maintain viability according to individual species requirements. The seed mix must be certified as weed free.

The seeding of the prepared sites should occur in the fall, as close to the winter rains as possible. Specifically, seeding should occur when there is a high probability of rain. The last two weeks in November is probably the optimum time.

Monitoring of the revegetated areas is important to evaluate the success of the procedure and to make recommendations if failure occurs. The monitoring needs to be conducted by a qualified ecologist with arid-land revegetation experience. Monitoring should occur at least monthly for the first four months after re-seeding. Factors to evaluate may include, but are not limited to, a measure of seedling emergence and growth, measures of species composition and abundance, weed colonization, animal damage and browsing (need for fencing), erosion, and need for

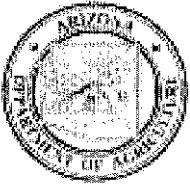
irrigation. If seed germination does not occur, then probable cause(s) should be assessed, and recommendations developed to improve the next seeding. Examples of probable cause may include improper site preparation, lack of rain, bird or insect seed predation, or disease. A record of these observations should be provided to DMAFB after each monitoring event. The report should recommend any corrective action that needs to be taken to help ensure the success of the re-seeding effort. After the first four months monitoring can occur every third month with the same observations being recorded. Monitoring should continue for a five-year period after initiation of the re-seeding effort. More than one seeding event may be needed. If successful plant establishment occurs before the end of the five-year period, monitoring may end.

Associated with the monitoring should be an assessment of the need to irrigate the re-seeded sites and the need for fencing. If the ecologist conducting the monitoring determines that irrigation and/or fencing is necessary to ensure success, then these elements should be implemented. Irrigation would be deemed necessary if sufficient rain occurs to stimulate seed germination and then the soil dries quickly due to wind or high temperatures. The ecologist then would recommend the amount, frequency, and delivery mode for supplemental watering.

Weeds such as Russian thistle (*Salsola iberica*) may become established in the revegetation plots. Weeds can serve as a nurse crop to the establishing native plant seedlings. Also, a weed control effort may harm the new plants. Therefore, no weed control efforts should occur until native plant size is sufficient to sustain a weed control effort. The monitoring ecologist must report weed invasion and the proper time to control the weed plants. The weed control method may vary according to the species, size and densities of the plants. The method selected for weed control must not damage the native vegetation in the revegetation plots or the surrounding area.

While the above provides guidelines for revegetation efforts in xeric environments such as the Sonoran Desert surrounding Tucson and Davis-Monthan Air Force Base, it is strongly recommended that the Base seek local expertise such as that provided through the Natural Resources Conservation Service (NRCS). The NRCS Tucson Field Office can provide advice based on direct revegetation experience in the Tucson area, and provide linkage to other resources such as the NRCS Tucson Plant Materials Center. The primary contact at the NRCS Tucson Field Office would be Kristen Egan (520-670-6380).

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Arizona Department of Agriculture (ADA)
Licensing and Registration Section
1688 West Adams, Phoenix, Arizona 85007
Phone: (602) 364-0935
Fax: (602) 542-0466

Notice of Intent to Clear Land

ARS § 3-904

Pursuant to A.R.S. § 3-904 the undersigned, as Owner of the Property described herein, gives this Notice of Intent to Clear Land of protected native plants.

1. **Owner/landowner's agent.** The owner or landowner's agent of the Property upon which protected native plants will be affected:

Owner's Name _____ Phone _____

Address _____

Agent's Name _____ Phone _____

Address _____

2. **Property.** The description and location of the Property upon which protected native plants will be affected:

County _____

Name of Property/Project _____

Address _____

Physical Location (attach map) _____

(Note: Map must also show surrounding land for 1/2 mile in each direction)

Tax Parcel ID Nos. _____

Legal Description (or attach copy) _____

Number of Acres to be Cleared _____

3. **Owner's Intent.** Landowner's intentions when clearing private land of protected native plants.

☐ Owner intends to allow salvage of the plants, and agrees to be contacted by native plant salvagers.

☐ Owner intends to transplant the plants onto the same property, or to another property he also owns.

☐ Owner has already arranged for salvage of the plants.

☐ Owner does not intend to allow salvage of the plants.

☐ Other _____

4. **Approximate starting date.** _____

(See notice period listed on reverse side)

The information contained in this application is true and accurate to the best of my knowledge. I understand that providing false information is a felony in Arizona

Signature _____ Date _____

Notice to salvagers: Consent of the landowner is required before entering any lands described in this notice.

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APPENDIX C

Air Quality Emission Calculation

Appendix C - Clean Air Act - General Conformity Analysis

Emissions Estimates for EA of Removal of Objects Along Flightline at Davis-Monthan AFB, AZ - Construction

This workbook contains

- | | |
|-------------------|--|
| Summary | (this worksheet) Summarizes total emissions by calendar year. |
| Combustion | (one sheet for each calendar year) Estimates emissions from non-road equipment exhaust |
| Grading | (one sheet for each calendar year) Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions) |
| Fugitive | (one sheet for each calendar year) Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust. |

Summary of Construction Emissions

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (Alt 1) (ton)	Fugitive Dust Emissions With BMPs (Alt 1)
CY2006	Combustion	45.62	10.49	20.40	2.76	6.49	
	Fugitive Dust					205.13	65.64
	TOTAL CY2006	45.62	10.49	20.40	2.76	211.62	
CY2007		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)	
	Combustion	27.32	4.27	5.91	1.82	4.78	
	Fugitive Dust					181.54	58.09
	TOTAL CY2007	27.32	4.27	5.91	1.82	186.32	
CY2009		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)	
	Combustion	3.45	0.54	0.75	0.23	0.60	
	Fugitive Dust					24.29	7.77
	TOTAL CY2009	3.45	0.54	0.75	0.23	24.90	

General Conformity Regional Significance Thresholds (10% of regional budget)

Since future year budgets were not readily available, actual 1999 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Pima County Intrastate AQCR

Year	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM10 (tpy)
1999	38,495	39,298	274,210	4,978	31,081

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/nettier.html>). Site visited on 8/24/04

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)
CY2006	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	45.62	10.49	20.40	2.76	211.62
	Percent of Pima Co	0.00119	0.00027	0.00007	0.00055	0.00681
CY2007	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	27.32	4.27	5.91	1.82	186.32
	Percent of Pima Co	0.00071	0.00011	0.00002	0.00037	0.00599
CY2009	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	3.45	0.54	0.75	0.23	24.90
	Percent of Pima Co	0.00009	0.00001	0.00000	0.00005	0.00080

Proposed Construction and Demolition Projects for EA of Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 Perimeter/Columbia Drive and Ditch	528,818	ft ²
2 Fuel Tank (generator) at PAR	100	ft ²
3 Culverts and Ditches in CZ	253,955	ft ²
4 Fire Hydrants (22)	44	ft ²
5 Pumphouses 201 & 204 and Facilities	1078	ft ²
6 Flightline Fence for Helipad	71,874	ft ²
7 50% of Grade Vegetation in CZ	6,468,442	ft ²

Construction Site Air EmissionsCombustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	73,096	ft ²	(2, 4, 5, & 6)
Total Paved Area:	528,818	ft ²	(1)
Total Disturbed Area:	168.14	acres	(1-7)
Construction Duration:	1.0	years	(assumed)
Annual Construction Activity:	230	days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	91.23	396.73	24.02	177.42	56.44
Emissions, tons/yr	10.49	45.62	2.76	20.40	6.49

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO ₂	CO	PM ₁₀
Total new acres disturbed:	168.14	168.14	168.14	168.14	168.14
Total new acres paved:	12.14	12.14	12.14	12.14	12.14
Total new building space, ft ² :	73,096	73,096	73,096	73,096	73,096
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	168.14	168.14	168.14	168.14	168.14
Area paved, acres in 1 yr:	12.14	12.14	12.14	12.14	12.14
Building space, ft ² in 1 yr:	73,096	73,096	73,096	73,096	73,096

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO ₂	CO	PM ₁₀
Grading Equipment	42.0	269.0	17.9	58.2	47.1
Asphalt Paving	3.2	0.0	0.0	0.0	0.0
Stationary Equipment	12.3	10.0	0.7	2.2	0.6
Mobile Equipment	11.7	117.7	5.5	117.0	8.8
Architectural Coatings (Non-Res)	22.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	91.2	396.7	24.0	177.4	56.4

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO ₂ *	CO *	PM ₁₀
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	168.14	acres/yr	(From "Combustion" worksheet)
Grading days/yr:	27	days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr	graded area is exposed
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7	%	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60	days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7	%	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	27.34	vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6	lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	1.3 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	137 VMT/day	
Construction VMT per acre	22.2 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	1.3 hr/acre	1.6 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	22.2 VMT/acre	35.5 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	1.6 lbs/acre	168.14	NA	269	0.13
Grading	0.8 lbs/acre	168.14	NA	135	0.07
Vehicle Traffic	35.5 lbs/acre	168.14	NA	5,969	2.98
Erosion of Soil Piles	0.3 lbs/acre/day	168.14	90	4,389	2.19
Erosion of Graded Surface	26.4 lbs/acre/day	168.14	90	399,508	199.75
TOTAL				410,269	205.13

Soil Disturbance EF: 37.9 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 89.3 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 168.14 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 20.18 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compaction.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	168.14	280.24
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	168.14	82.20
022 242 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	84.07	84.77
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	84.07	34.78
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	168.14	69.56
TOTAL								551.55

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 551.55

Qty Equipment: 20.18

Grading days/yr: 27.34

Round to	27 grading days/yr
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Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 50% of Grade Vegetation in CZ 6,468,442 ft²**Construction Site Air Emissions**Combustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	0 ft ²	None
Total Paved Area:	0 ft ²	None
Total Disturbed Area:	148.50 acres	(1)
Construction Duration:	1.0 years	(assumed)
Annual Construction Activity:	230 days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	37.12	237.59	15.80	51.42	41.58
Emissions, tons/yr	4.27	27.32	1.82	5.91	4.78

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	148.50	148.50	148.50	148.50	148.50
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	0	0	0	0	0
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	148.50	148.50	148.50	148.50	148.50
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	0	0	0	0	0

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	37.1	237.6	15.8	51.4	41.6
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	0.0	0.0	0.0	0.0	0.0
Mobile Equipment	0.0	0.0	0.0	0.0	0.0
Architectural Coatings (Non-Res)	0.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	37.1	237.6	15.8	51.4	41.6

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	148.50	acres/yr	(From "Combustion" worksheet)
Grading days/yr:	27	days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr	graded area is exposed
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7	%	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60	days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7	%	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	27.34	vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6	lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	1.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	137 VMT/day	
Construction VMT per acre	25.2 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	1.5 hr/acre	1.8 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	25.2 VMT/acre	40.3 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	1.8 lbs/acre	148.50	NA	267	0.13
Grading	0.8 lbs/acre	148.50	NA	119	0.06
Vehicle Traffic	40.3 lbs/acre	148.50	NA	5,984	2.99
Erosion of Soil Piles	0.3 lbs/acre/day	148.50	90	3,876	1.94
Erosion of Graded Surface	26.4 lbs/acre/day	148.50	90	352,824	176.41
TOTAL				363,070	181.54

Soil Disturbance EF: 42.9 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 89.4 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 148.50 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 17.82 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	148.50	247.49
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	148.50	72.60
022 242 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	74.25	74.87
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	74.25	30.71
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	148.50	61.43
TOTAL								487.10

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 487.10

Qty Equipment: 17.82

Grading days/yr: 27.34

Round to	27 grading days/yr
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Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 100% of Grade Hill in PS 12 End 816,314 ft²**Construction Site Air Emissions**Combustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area: 0 ft² None
 Total Paved Area: 0 ft² None
 Total Disturbed Area: 18.74 acres (1)
 Construction Duration: 1.0 years (assumed)
 Annual Construction Activity: 230 days/yr (assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	4.69	29.98	1.99	6.49	5.25
Emissions, tons/yr	0.54	3.45	0.23	0.75	0.60

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	18.74	18.74	18.74	18.74	18.74
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	0	0	0	0	0
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	18.74	18.74	18.74	18.74	18.74
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	0	0	0	0	0

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	4.7	30.0	2.0	6.5	5.2
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	0.0	0.0	0.0	0.0	0.0
Mobile Equipment	0.0	0.0	0.0	0.0	0.0
Architectural Coatings (Non-Res)	0.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	4.7	30.0	2.0	6.5	5.2

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/d	1.60E+00 lbs/acre/d	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/d	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft ²	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	18.74	acres/yr	(From "Combustion" worksheet)
Grading days/yr:	20	days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr	graded area is exposed
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7	%	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60	days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7	%	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	20.49	vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6	lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	8.7 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	102 VMT/day	
Construction VMT per acre	112 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	8.7 hr/acre	10.6 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	112 VMT/acre	179.1 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	10.6 lbs/acre	18.74	NA	199	0.10
Grading	0.8 lbs/acre	18.74	NA	15	0.01
Vehicle Traffic	179.1 lbs/acre	18.74	NA	3,356	1.68
Erosion of Soil Piles	0.3 lbs/acre/day	18.74	90	489	0.24
Erosion of Graded Surface	26.4 lbs/acre/day	18.74	90	44,526	22.26
TOTAL				48,585	24.29

Soil Disturbance EF: 190.5 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 126.5 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 18.74 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 3.00 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	18.74	31.23
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	18.74	9.16
022 242 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	9.37	9.45
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	9.37	3.88
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	18.74	7.75
TOTAL								61.47

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 61.47

Qty Equipment: 3.00

Grading days/yr: 20.49

Round to	20 grading days/yr
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PIMA INTRASTATE AQCR (PIMA COUNTY)

Row #	State	County	Area Source Emissions							Point Source Emissions						
			CO	NH3	NOx	PM10	PM2.5	SO2	VOC	CO	NH3	NOx	PM10	PM2.5	SO2	VOC
<u>Sort</u>																
1	AZ	Pima Co	271,978	2,231	30,102	30,182	10,183	1,876	39,224	2,232	8.7	8,393	899	385	3,102	74
Grand Total			271,978	2,231	30,102	30,182	10,183	1,876	39,224	2,232	8.7	8,393	899	385	3,102	74

Source: USEPA 1999. <http://www.epa.gov/air/data/nettier.html> <site accessed on August 25, 2004>

Appendix C - Clean Air Act - General Conformity Analysis

Emissions Estimates for EA of Removal of Objects Along Flightline at Davis-Monthan AFB, AZ - Construction

This workbook contains

- | | |
|-------------------|--|
| Summary | (this worksheet) Summarizes total emissions by calendar year. |
| Combustion | (one sheet for each calendar year) Estimates emissions from non-road equipment exhaust |
| Grading | (one sheet for each calendar year) Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions) |
| Fugitive | (one sheet for each calendar year) Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust. |

Summary of Construction Emissions

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (Alt 1) (ton)	Fugitive Dust Emissions With BMPs (Alt B)
CY2006	Combustion	34.60	8.77	18.02	2.03	4.56	
	Fugitive Dust					133.15	42.61
	TOTAL CY2006	34.60	8.77	18.02	2.03	137.71	
CY2007		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)	
	Combustion	16.30	2.55	3.53	1.08	2.85	
	Fugitive Dust					109.56	35.06
	TOTAL CY2007	16.30	2.55	3.53	1.08	112.41	
CY2009		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)	
	Combustion	3.45	0.54	0.75	0.23	0.60	
	Fugitive Dust					24.29	7.77
	TOTAL CY2009	3.45	0.54	0.75	0.23	24.90	

General Conformity Regional Significance Thresholds (10% of regional budget)

Since future year budgets were not readily available, actual 1999 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Pima County Intrastate AQCR

Year	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM10 (tpy)
1999	38,495	39,298	274,210	4,978	31,081

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/nettier.html>). Site visited on 8/24/04

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)
CY2006	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	34.60	8.77	18.02	2.03	137.71
	Percent of Pima Co	0.00090	0.00022	0.00007	0.00041	0.00443
CY2007	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	16.30	2.55	3.53	1.08	112.41
	Percent of Pima Co	0.00042	0.00006	0.00001	0.00022	0.00362
CY2009	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	3.45	0.54	0.75	0.23	24.90
	Percent of Pima Co	0.00009	0.00001	0.00000	0.00005	0.00080

Proposed Construction and Demolition Projects for EA of Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 Perimeter/Columbia Drive and Ditch	528,818	ft ²
2 Fuel Tank (generator) at PAR	100	ft ²
3 Culverts and Ditches in CZ	253,955	ft ²
4 Fire Hydrants (22)	44	ft ²
5 Pumphouses 201 & 204 and Facility 203	1078	ft ²
6 Flightline Fence for Helipad	71,874	ft ²
7 50% of Grade Vegetation in CZ	3,858,763	ft ²

Construction Site Air EmissionsCombustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	73,096	ft ²	(2, 4, 5, & 6)
Total Paved Area:	528,818	ft ²	(none)
Total Disturbed Area:	108.23	acres	(1-7)
Construction Duration:	1.0	years	(assumed)
Annual Construction Activity:	230	days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	76.25	300.87	17.65	156.67	39.66
Emissions, tons/yr	8.77	34.60	2.03	18.02	4.56

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	108.23	108.23	108.23	108.23	108.23
Total new acres paved:	12.14	12.14	12.14	12.14	12.14
Total new building space, ft ² :	73,096	73,096	73,096	73,096	73,096
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	108.23	108.23	108.23	108.23	108.23
Area paved, acres in 1 yr:	12.14	12.14	12.14	12.14	12.14
Building space, ft ² in 1 yr:	73,096	73,096	73,096	73,096	73,096

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	27.1	173.2	11.5	37.5	30.3
Asphalt Paving	3.2	0.0	0.0	0.0	0.0
Stationary Equipment	12.3	10.0	0.7	2.2	0.6
Mobile Equipment	11.7	117.7	5.5	117.0	8.8
Architectural Coatings (Non-Res)	22.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	76.2	300.9	17.6	156.7	39.7

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	108.23	acres/yr	(From "Combustion" worksheet)
Grading days/yr:	27	days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr	graded area is exposed
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7	%	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60	days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7	%	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	27.34	vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6	lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	2 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	137 VMT/day	
Construction VMT per acre	34.5 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	2 hr/acre	2.4 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	34.5 VMT/acre	55.2 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	2.4 lbs/acre	108.23	NA	260	0.13
Grading	0.8 lbs/acre	108.23	NA	87	0.04
Vehicle Traffic	55.2 lbs/acre	108.23	NA	5,974	2.99
Erosion of Soil Piles	0.3 lbs/acre/day	108.23	90	2,825	1.41
Erosion of Graded Surface	26.4 lbs/acre/day	108.23	90	257,162	128.58
TOTAL				266,307	133.15

Soil Disturbance EF: 58.4 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 90.0 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 108.23 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 12.99 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	108.23	180.39
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	108.23	52.91
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	54.12	54.57
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	54.12	22.39
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	108.23	44.77
TOTAL								355.03

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 355.03

Qty Equipment: 12.99

Grading days/yr: 27.34

Round to	27 grading days/yr
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Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 50% of Grade Vegetation in CZ 3,858,763 ft²**Construction Site Air Emissions**Combustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	0 ft ²	None
Total Paved Area:	0 ft ²	None
Total Disturbed Area:	88.59 acres	(1)
Construction Duration:	1.0 years	(assumed)
Annual Construction Activity:	230 days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	22.15	141.74	9.43	30.68	24.80
Emissions, tons/yr	2.55	16.30	1.08	3.53	2.85

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	88.59	88.59	88.59	88.59	88.59
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	0	0	0	0	0
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	88.59	88.59	88.59	88.59	88.59
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	0	0	0	0	0

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	22.1	141.7	9.4	30.7	24.8
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	0.0	0.0	0.0	0.0	0.0
Mobile Equipment	0.0	0.0	0.0	0.0	0.0
Architectural Coatings (Non-Res)	0.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	22.1	141.7	9.4	30.7	24.8

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.

Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	88.59 acres/yr	(From "Combustion" worksheet)
Grading days/yr:	27 days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed
Grading Hours/day:	8 hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)
Soil percent silt, s:	8.5 %	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7 %	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60 days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7 %	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)
Mean vehicle speed, S:	5 mi/hr	(On-site)
Dozer path width:	8 ft	
Qty construction vehicles:	27.34 vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5 mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6 lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40 tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	2.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	137 VMT/day	
Construction VMT per acre	42.2 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	2.5 hr/acre	3.1 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	42.2 VMT/acre	67.5 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	3.1 lbs/acre	88.59	NA	275	0.14
Grading	0.8 lbs/acre	88.59	NA	71	0.04
Vehicle Traffic	67.5 lbs/acre	88.59	NA	5,979	2.99
Erosion of Soil Piles	0.3 lbs/acre/day	88.59	90	2,312	1.16
Erosion of Graded Surface	26.4 lbs/acre/day	88.59	90	210,478	105.24
TOTAL				219,115	109.56

Soil Disturbance EF: 71.4 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 90.5 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 88.59 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 10.63 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	88.59	147.64
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	88.59	43.31
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	44.29	44.66
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	44.29	18.32
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	88.59	36.65
TOTAL								290.58

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 290.58

Qty Equipment: 10.63

Grading days/yr: 27.34

Round to	27 grading days/yr
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Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 100% of Grade Hill in PS 12 End 816,314 ft²**Construction Site Air Emissions**Combustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area: 0 ft² None
 Total Paved Area: 0 ft² None
 Total Disturbed Area: 18.74 acres (1)
 Construction Duration: 1.0 years (assumed)
 Annual Construction Activity: 230 days/yr (assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	4.69	29.98	1.99	6.49	5.25
Emissions, tons/yr	0.54	3.45	0.23	0.75	0.60

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	18.74	18.74	18.74	18.74	18.74
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	0	0	0	0	0
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	18.74	18.74	18.74	18.74	18.74
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	0	0	0	0	0

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	4.7	30.0	2.0	6.5	5.2
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	0.0	0.0	0.0	0.0	0.0
Mobile Equipment	0.0	0.0	0.0	0.0	0.0
Architectural Coatings (Non-Res)	0.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	4.7	30.0	2.0	6.5	5.2

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/d	1.60E+00 lbs/acre/d	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/d	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft ²	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.

Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	18.74 acres/yr	(From "Combustion" worksheet)
Grading days/yr:	20 days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed
Grading Hours/day:	8 hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)
Soil percent silt, s:	8.5 %	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7 %	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60 days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7 %	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)
Mean vehicle speed, S:	5 mi/hr	(On-site)
Dozer path width:	8 ft	
Qty construction vehicles:	20.49 vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5 mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6 lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40 tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	8.7 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	102 VMT/day	
Construction VMT per acre	112 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	8.7 hr/acre	10.6 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	112 VMT/acre	179.1 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	10.6 lbs/acre	18.74	NA	199	0.10
Grading	0.8 lbs/acre	18.74	NA	15	0.01
Vehicle Traffic	179.1 lbs/acre	18.74	NA	3,356	1.68
Erosion of Soil Piles	0.3 lbs/acre/day	18.74	90	489	0.24
Erosion of Graded Surface	26.4 lbs/acre/day	18.74	90	44,526	22.26
TOTAL				48,585	24.29

Soil Disturbance EF: 190.5 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 126.5 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 18.74 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 3.00 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	18.74	31.23
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	18.74	9.16
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	9.37	9.45
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	9.37	3.88
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	18.74	7.75
TOTAL								61.47

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 61.47

Qty Equipment: 3.00

Grading days/yr: 20.49

Round to	20 grading days/yr
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PIMA INTRASTATE AQCR (PIMA COUNTY)

Row #	State	County	Area Source Emissions							Point Source Emissions						
			CO	NH3	NOx	PM10	PM2.5	SO2	VOC	CO	NH3	NOx	PM10	PM2.5	SO2	VOC
1	AZ	Pima Co	271,978	2,231	30,102	30,182	10,183	1,876	39,224	2,232	8.7	8,393	899	385	3,102	74
Grand Total			271,978	2,231	30,102	30,182	10,183	1,876	39,224	2,232	8.7	8,393	899	385	3,102	74

Source: USEPA 1999. <http://www.epa.gov/air/data/nettier.html> <site accessed on August 25, 2004>

Appendix C - Clean Air Act - General Conformity Analysis

Emissions Estimates for EA of Removal of Objects Along Flightline at Davis-Monthan AFB, AZ - Construction

This workbook contains

- | | |
|-------------------|--|
| Summary | (this worksheet) Summarizes total emissions by calendar year. |
| Combustion | (one sheet for each calendar year) Estimates emissions from non-road equipment exhaust |
| Grading | (one sheet for each calendar year) Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions) |
| Fugitive | (one sheet for each calendar year) Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust. |

Summary of Construction Emissions

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (Alt 1) (ton)	Fugitive Dust Emissions With BMPs (Alt B)
CY2006	Combustion	32.37	8.05	17.53	1.88	4.17	
	Fugitive Dust					118.57	37.94
	TOTAL CY2006	32.37	8.05	17.53	1.88	122.74	
CY2007		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)	
	Combustion	16.30	2.55	3.53	1.08	2.85	
	Fugitive Dust					109.56	35.06
	TOTAL CY2007	16.30	2.55	3.53	1.08	112.41	
CY2009		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)	
	Combustion	0.00	0.00	0.00	0.00	0.00	
	Fugitive Dust					0.00	0.00
	TOTAL CY2009	0.00	0.00	0.00	0.00	0.00	

General Conformity Regional Significance Thresholds (10% of regional budget)

Since future year budgets were not readily available, actual 1999 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is several orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data set were used.

Pima County Intrastate AQCR

Year	Point and Area Sources Combined				
	NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM10 (tpy)
1999	38,495	39,298	274,210	4,978	31,081

Source: USEPA-AirData NET Tier Report (<http://www.epa.gov/air/data/nettier.html>). Site visited on 8/24/04

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)
CY2006	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	32.37	8.05	17.53	1.88	122.74
	Percent of Pima Co	0.00084	0.00020	0.00006	0.00038	0.00395
CY2007	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	16.30	2.55	3.53	1.08	112.41
	Percent of Pima Co	0.00042	0.00006	0.00001	0.00022	0.00362
CY2009	Pima County	38,495	39,298	274,210	4,978	31,081
	Proposed Action	0.00	0.00	0.00	0.00	0.00
	Percent of Pima Co	0.00000	0.00000	0.00000	0.00000	0.00000

Proposed Construction and Demolition Projects for EA of Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 Perimeter/Columbia Drive and Ditch	-	ft ²
2 Fuel Tank (generator) at PAR	100	ft ²
3 Culverts and Ditches in CZ	253,955	ft ²
4 Fire Hydrants (22)	44	ft ²
5 Pumphouses 201 & 204 and Facility 203	1078	ft ²
6 Flightline Fence for Helipad	71,874	ft ²
7 50% of Grade Vegetation in CZ	3,858,763	ft ²

Construction Site Air EmissionsCombustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	73,096	ft ²	(2, 4, 5, & 6)
Total Paved Area:	0	ft ²	(none)
Total Disturbed Area:	96.09	acres	(1-7)
Construction Duration:	1.0	years	(assumed)
Annual Construction Activity:	230	days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	70.03	281.45	16.36	152.47	36.26
Emissions, tons/yr	8.05	32.37	1.88	17.53	4.17

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	96.09	96.09	96.09	96.09	96.09
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	73,096	73,096	73,096	73,096	73,096
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	96.09	96.09	96.09	96.09	96.09
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	73,096	73,096	73,096	73,096	73,096

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	24.0	153.7	10.2	33.3	26.9
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	12.3	10.0	0.7	2.2	0.6
Mobile Equipment	11.7	117.7	5.5	117.0	8.8
Architectural Coatings (Non-Res)	22.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	70.0	281.4	16.4	152.5	36.3

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	96.09 acres/yr	(From "Combustion" worksheet)
Grading days/yr:	27 days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed
Grading Hours/day:	8 hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)
Soil percent silt, s:	8.5 %	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7 %	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60 days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7 %	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)
Mean vehicle speed, S:	5 mi/hr	(On-site)
Dozer path width:	8 ft	
Qty construction vehicles:	27.34 vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5 mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6 lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40 tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	2.3 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	137 VMT/day	
Construction VMT per acre	38.9 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	2.3 hr/acre	2.8 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	38.9 VMT/acre	62.2 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	2.8 lbs/acre	96.09	NA	269	0.13
Grading	0.8 lbs/acre	96.09	NA	77	0.04
Vehicle Traffic	62.2 lbs/acre	96.09	NA	5,977	2.99
Erosion of Soil Piles	0.3 lbs/acre/day	96.09	90	2,508	1.25
Erosion of Graded Surface	26.4 lbs/acre/day	96.09	90	228,317	114.16
TOTAL				237,148	118.57

Soil Disturbance EF: 65.8 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 90.3 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 96.09 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 11.53 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	96.09	160.16
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	96.09	46.98
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	48.05	48.45
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	48.05	19.88
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	96.09	39.75
TOTAL								315.21

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 315.21

Qty Equipment: 11.53

Grading days/yr: 27.34

Round to	27 grading days/yr
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Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 50% of Grade Vegetation in CZ 3,858,763 ft²**Construction Site Air Emissions**Combustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	0 ft ²	None
Total Paved Area:	0 ft ²	None
Total Disturbed Area:	88.59 acres	(1)
Construction Duration:	1.0 years	(assumed)
Annual Construction Activity:	230 days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	22.15	141.74	9.43	30.68	24.80
Emissions, tons/yr	2.55	16.30	1.08	3.53	2.85

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	88.59	88.59	88.59	88.59	88.59
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	0	0	0	0	0
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	88.59	88.59	88.59	88.59	88.59
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	0	0	0	0	0

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	22.1	141.7	9.4	30.7	24.8
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	0.0	0.0	0.0	0.0	0.0
Mobile Equipment	0.0	0.0	0.0	0.0	0.0
Architectural Coatings (Non-Res)	0.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	22.1	141.7	9.4	30.7	24.8

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
 Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	88.59 acres/yr	(From "Combustion" worksheet)
Grading days/yr:	27 days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed
Grading Hours/day:	8 hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)
Soil percent silt, s:	8.5 %	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7 %	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60 days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7 %	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)
Mean vehicle speed, S:	5 mi/hr	(On-site)
Dozer path width:	8 ft	
Qty construction vehicles:	27.34 vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5 mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6 lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40 tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	2.5 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	137 VMT/day	
Construction VMT per acre	42.2 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	2.5 hr/acre	3.1 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	42.2 VMT/acre	67.5 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	3.1 lbs/acre	88.59	NA	275	0.14
Grading	0.8 lbs/acre	88.59	NA	71	0.04
Vehicle Traffic	67.5 lbs/acre	88.59	NA	5,979	2.99
Erosion of Soil Piles	0.3 lbs/acre/day	88.59	90	2,312	1.16
Erosion of Graded Surface	26.4 lbs/acre/day	88.59	90	210,478	105.24
TOTAL				219,115	109.56

Soil Disturbance EF: 71.4 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 90.5 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 88.59 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 10.63 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	88.59	147.64
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	88.59	43.31
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	44.29	44.66
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	44.29	18.32
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	88.59	36.65
TOTAL								290.58

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 290.58

Qty Equipment: 10.63

Grading days/yr: 27.34

Round to	27 grading days/yr
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Removal of Objects Along Flightline at Davis-Monthan AFB, AZ

Includes:

1 100% of Grade Hill in PS 12 End - ft²**Construction Site Air Emissions**Combustion Emissions of ROG, NO_x, SO₂, CO and PM₁₀ Due to Construction**User Inputs:**

Total Building Area:	0 ft ²	None
Total Paved Area:	0 ft ²	None
Total Disturbed Area:	0.00 acres	(1)
Construction Duration:	1.0 years	(assumed)
Annual Construction Activity:	230 days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	ROG	NO _x	SO ₂	CO	PM ₁₀
Emissions, lbs/day	0.00	0.00	0.00	0.00	0.00
Emissions, tons/yr	0.00	0.00	0.00	0.00	0.00

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	0.00	0.00	0.00	0.00	0.00
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft ² :	0	0	0	0	0
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft ² in 1 yr:	0	0	0	0	0

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	0.0	0.0	0.0	0.0	0.0
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	0.0	0.0	0.0	0.0	0.0
Mobile Equipment	0.0	0.0	0.0	0.0	0.0
Architectural Coatings (Non-Res)	0.0	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	0.0	0.0	0.0	0.0	0.0

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/d	1.60E+00 lbs/acre/d	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/d	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft ²	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction Fugitive Dust Emissions**

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	0.00 acres/yr	(From "Combustion" worksheet)
Grading days/yr:	0 days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed
Grading Hours/day:	8 hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)
Soil percent silt, s:	8.5 %	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	7 %	(http://www.cpc.noaa.gov/products/soilmst/drought_composite.html#CSMRP)
Annual rainfall days, p:	60 days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	7 %	Ave. of wind speed at Tucson, AZ
Fraction of TSP, J:	0.5	(SCAQMD recommendation)
Mean vehicle speed, S:	5 mi/hr	(On-site)
Dozer path width:	8 ft	
Qty construction vehicles:	0.00 vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5 mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6 lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3 (dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40 tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance ActivitiesOperation Parameters (Calculated from User Inputs)

Grading duration per acre	0 hr/acre	
Bulldozer mileage per acre	1 VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	0 VMT/day	
Construction VMT per acre	0 VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b / (M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	1.22 lbs/hr	0 hr/acre	0 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	1.60 lbs/VMT	0 VMT/acre	0 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 2.9 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 0.29 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	0 lbs/acre	0.00	NA	0	0.00
Grading	0.8 lbs/acre	0.00	NA	0	0.00
Vehicle Traffic	0.0 lbs/acre	0.00	NA	0	0.00
Erosion of Soil Piles	0.3 lbs/acre/day	0.00	90	0	0.00
Erosion of Graded Surface	26.4 lbs/acre/day	0.00	90	0	0.00
TOTAL				0	0.00

Soil Disturbance EF: 0.8 lbs/acre

Wind Erosion EF: 26.69 lbs/acre/day

Back calculate to get EF: 0.0 lbs/acre/grading day

Removal of Objects Along Flightline at Davis-Monthan AFB, AZ**Construction (Grading) Schedule**

Estimate of time required to grade a specified area.

Input Parameters

Construction area: 0.00 acres/yr (from "Combustion" Worksheet)
 Qty Equipment: 3.00 (calculated based on acres disturbed, assuming that up to three machines can effectively work on a 25 acre area, with a minimum of three machines for any job, regardless of area graded)

Assumptions.

Terrain is mostly flat.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	0.00	0.00
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	0.00	0.00
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	0.00	0.00
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	0.00	0.00
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	0.00	0.00
TOTAL								0.00

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.00

Qty Equipment: 3.00

Grading days/yr: 0.00

Round to	0 grading days/yr
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PIMA INTRASTATE AQCR (PIMA COUNTY)

Row #	State	County	Area Source Emissions							Point Source Emissions						
			CO	NH3	NOx	PM10	PM2.5	SO2	VOC	CO	NH3	NOx	PM10	PM2.5	SO2	VOC
1	AZ	Pima Co	271,978	2,231	30,102	30,182	10,183	1,876	39,224	2,232	8.74	8,393	899	385	3,102	73.9
Grand Total			271,978	2,231	30,102	30,182	10,183	1,876	39,224	2,232	8.74	8,393	899	385	3,102	73.9

Source: USEPA 1999. <http://www.epa.gov/air/data/nettier.html> <site accessed on August 25, 2004>